AGRICULTURAL *Chemicals*

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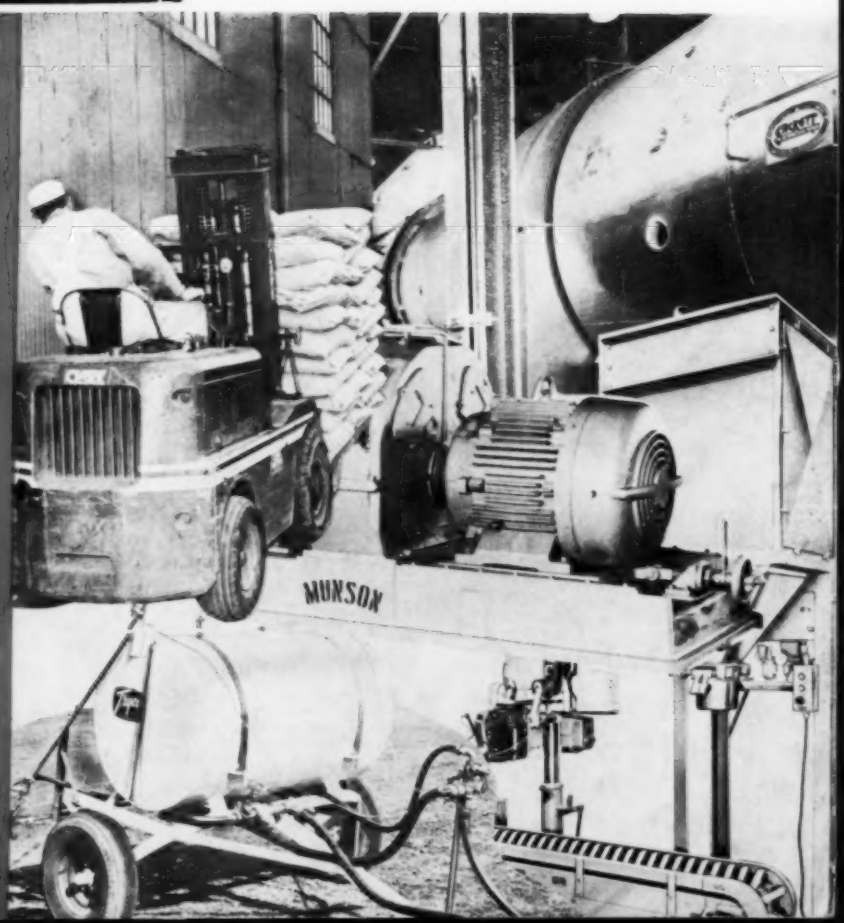
- Soil Fumigation
- New Equipment Review
- Handling Fertilizer Liquids
- 500 TPD Fertilizer Plant
- Emulsifiers for '59
- Kellett's Autogiro
- Ag-Frequency Solution
- NAC Highlights

NOVEMBER, 1958



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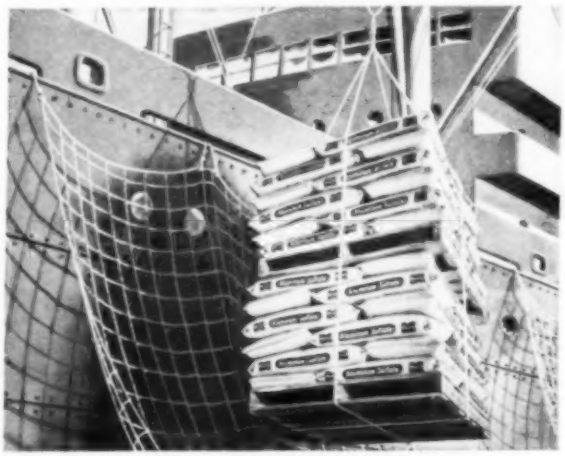

Stacked high or riding a sling, they cling. *Safer—resist slip and creep.*

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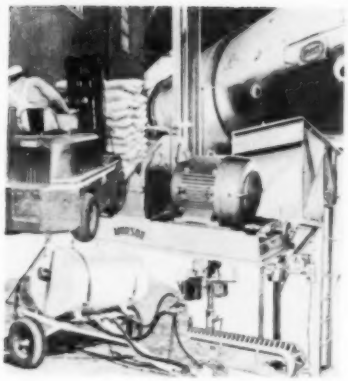

This Month's Cover

Featured in this issue is a review of equipment for the agricultural chemicals manufacturer and applicator. (Pages 42-52) The cover illustrates (l to r) the Clark tractor shovel, Munson's attrition mill, drier at CIL designed by Sackett, Tryco pump and Bemis' Rapid-Weigh bagger.

Vol. 13, No. 11 November, 1958

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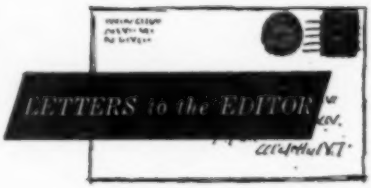

I read with great interest the last issue of AGRICULTURAL CHEMICALS and I would like to congratulate you on your good idea of The Custom Applicator section; I think it adds much to the attraction of your paper.

W. E. Ripper
Manor, Docking, England

I have found your article on "What the Dealer Should Know About Fertilizers" of particular interest, and should like to quote from this article in a report I am writing on the subject of bags for the fertilizer industry. We should, of course, give proper credit in doing so. We have specific reference to the section concerned with types of dealers selling fertilizers.

Mildred Bareis
CROWN ZELLERBACH CORPORATION
San Francisco, Calif.

We are in the anhydrous ammonia business in the State of Washington. We would appreciate more articles on grain crops and dry peas, inasmuch as corn is not grown in this area. Wheat is our leading crop. Also, we are very much interested in weed chemicals.

James W. Babb
BABB BROS. FERTILIZER CO.
Oakesdale, Washington

Ed: Thanks for your comments,—we'll be guided by them in scheduling future articles for *Agricultural Chemicals*.

We manufacture a garden insecticide sprayer and are, at the present, seeking a source for an insecticide plug or cartridge to be used with a new type sprayer we plan on producing shortly. Any information you may have concerning the manufacturer of such a product would sure be appreciated.

George B. Packard
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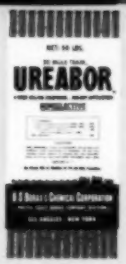
Ed: Can any of our readers supply Barco?

Congratulations to you for publishing the article "Chemical and Biological Methods of Pest Control" by Kenneth Hagen and Ray Smith in the July issue of your magazine. We consider this article of unusual interest for the entomologists and farmers here in Peru, and would like your permission to mimeograph a verbatim Spanish translation for distribution in this country.

Richard W. Bagley
COMITE DE DEFENSA TECHNCA DEL ALGODON
Lima, Peru

4 *easy ways to* **destroy weeds**

1 

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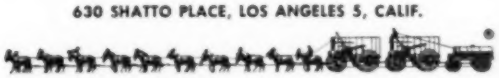

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Trade Listing

National Agricultural Chemicals Association. Association Building. 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute. 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

Regional Offices listed on page 123.

American Society of Agronomy. 2702 Monroe St., Madison Wisc. L. G. Monthey, executive secretary.

American Phytopathological Society. S. E. A. McCallan, secretary. Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society. 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists. P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute. Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers. F. B. Lanham, secretary. 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association. 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association. Sidney Bierly, executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino California.

Chemical Specialty Manufacturers' Association. 110 East 42nd St. New York City. Dr. H. W. Hamilton, secretary.

Entomological Society of America. 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

Mid-West Soil Improvement Committee, 121 West Wacker Drive, Chicago 1, Ill. Z. H. Beers, executive-secretary.

National Nitrogen Solutions Association. 2217 Tribune Tower, Chicago, Ill. M. F. Cellie, secretary.

National Cotton Council. PO Box 9905, Memphis, Tenn.

Soil Science Society of America. 2702 Monroe St., Madison, Wisc. L. G. Monthey, executive secretary.

Weed Society of America. W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association. Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.

In the Spotlight this Month

Handling Fertilizer Liquids . . . The relatively poor safety record of the fertilizer industry is due to a careless attitude. This discussion on handling fertilizer liquids with safety considers specific measures to be observed in all phases of storage, transfer, manufacture, handling raw materials, etc. Page 30.

Emulsifiers . . . A review of emulsifiers offered the formulator for 1959 pesticides. Included are discussions on the Tritons, Agrimuls, Emcols, Sole-Mulsifiers, and Toximuls. Page 28.

Aerial Application . . . Although the autogiro is not new in the aerial applicator field, Kellett believes its current production is the first offered the aerial applicator since World War II.

Equipment . . . New equipment offered the agricultural chemicals manufacturer and applicator is presented in this annual review. Highlights of 1958 are several new agricultural aeroplanes; Union Bag's I&C series 100; Raymond's rotomatic packers; Combustion's vertical mill; Sackett's crushing mill. Page 42-52.

Soil Fumigation . . . A limiting factor in the soil fumigation market is cost. Most fumigants today are applied to crops having a value in excess of $400 per acre. If cost of treatment could be reduced to open up the market to crops yielding as little as $200 per acre annually, and only 10% of this crop land was fumigated, acreage would be more than double that now treated. Page 33.

Pesticide Industry . . . A critical analysis of what's wrong with the pesticide industry,—what it needs to do to maintain the growth of the past 15 years,—as seen by a representative of a national distributor. Page 23.

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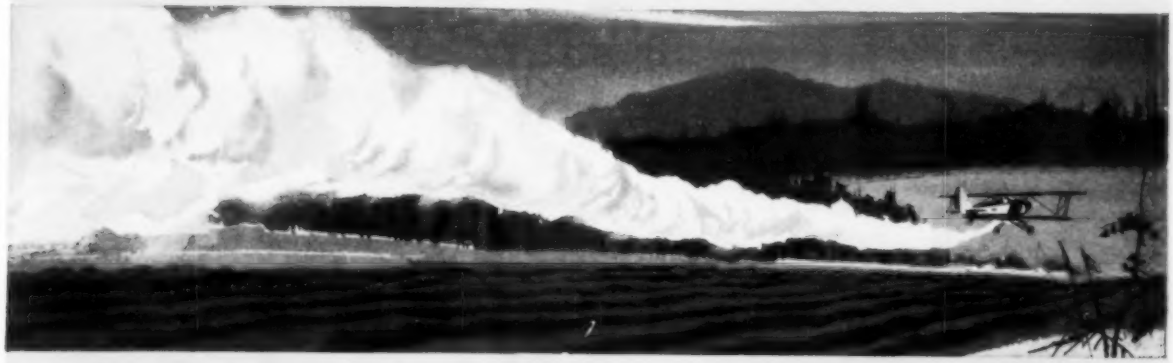

Here's a brand new emulsifier team . . . more effective than ever over a wide range of chlorinated insecticides. Best of all, Toximul A and Toximul B offer new low price, outstanding flash dispersion, excellent clarity, uniformity, and stability.

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Like these manufacturers, you'll find that the savings achieved with Union's I & C Bagger will pay for its cost in a remarkably short time.

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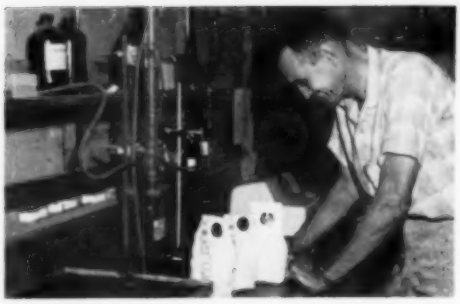
STRAIGHT FACTS FROM THE FIELD . . .



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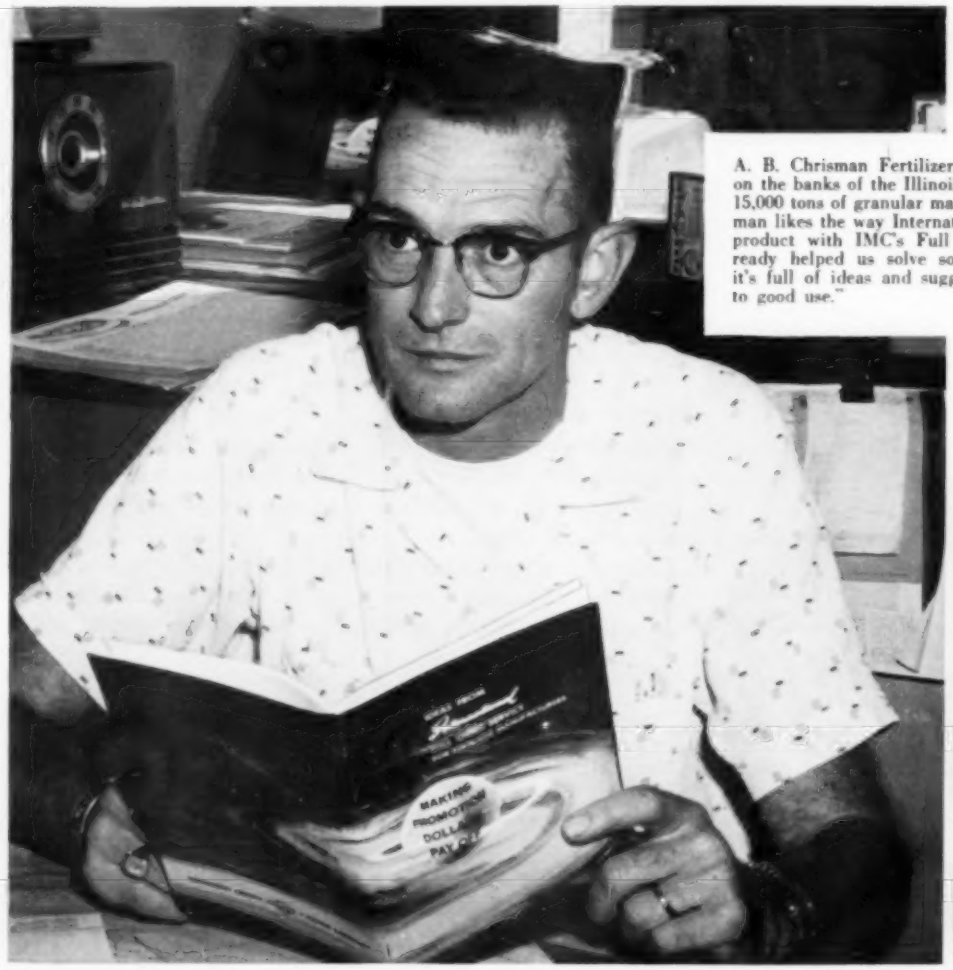
says A. B. Chrisman,

President, A. B. Chrisman Fertilizer Company, Meredosia, Illinois



A. B. Chrisman Fertilizer Company, located almost on the banks of the Illinois River, produces 12,000 to 15,000 tons of granular material annually. Mr. Chrisman likes the way International Minerals backs their product with IMC's Full Orbit Program. "It's already helped us solve some business problems — it's full of ideas and suggestions that we're putting to good use."

Joe Smith, Plant Superintendent, checks on carefully regulated flow of materials going into mixer, assuring a guaranteed dependable analysis of grade for the Meredosia area.

Out goes a sack of 0-46-0 on the back of Roland Ransom. Most popular ABC brand fertilizers are 12-12-12 and 16-8-8. Chrisman uses IMC coarse run-of-pile . . . markets up to 12 different grades of fertilizer.

A. B. Chrisman has been buying IMC Triple Superphosphate for the past 2½ years. Asked why he uses International's Triple, he replied, "I started on International Triple Super because they were the first to ship by barge up the Illinois River to this area. I'd had promises of material being barged in by other firms but they didn't deliver. International promised *and delivered!*

"The folks at IMC make it a business to know my problems, so they can give me the service I need when I need it. They work right along with me and help me anticipate my needs during the busy season when the rush is on.

"Shipment is always just what I order too," adds Chrisman. "I use International Minerals' coarse run-of-pile. It's top-notch quality material . . . has just the characteristics we need to help us manufacture our granular mixed goods."

You can benefit from International's triple super service. Write, wire or call for details.

Growing business necessitated expanded facilities. Chrisman and building contractor, Russell Collison, discuss new building that will add storage for 1500 tons of material.

Creators of Living Minerals

MINERALS International CHEMICALS

PHOSPHATE CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

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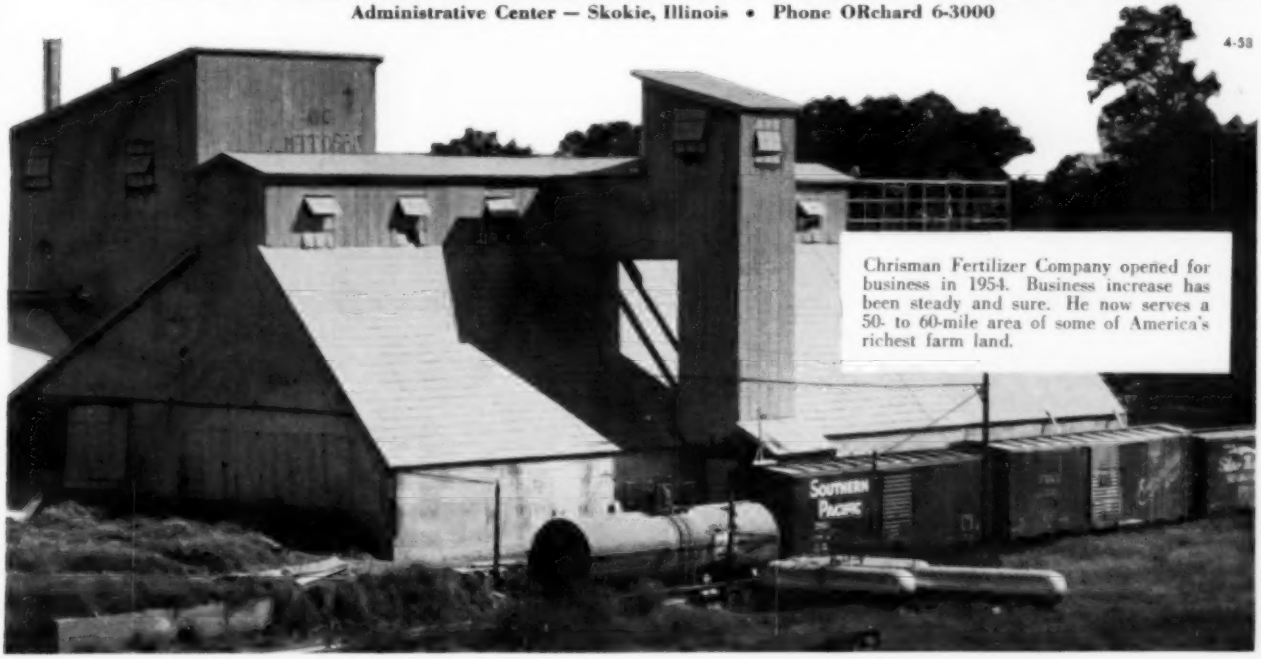
4-58



Chrisman Fertilizer Company opened for business in 1954. Business increase has been steady and sure. He now serves a 50- to 60-mile area of some of America's richest farm land.

"No ifs, ands, or butts . . . feed grown from potash-enriched soil is the best!"

FOR FERTILIZER MANUFACTURERS! USP now offers three outstanding grades of potash. USP's Higran, a new specially sized white granular (62/63% K_2O) and USP's Higrade muriate (also 62/63% K_2O). Both are the purest agricultural muriates now available. USP also offers Granular muriate which contains 60% K_2O. All three are non-caking and free-flowing throughout.

Our Technical Service Department welcomes your inquiries.

UNITED STATES POTASH COMPANY

DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION
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SUNSHINE STATE POTASH U.S.A. PRODUCT OF NEW MEXICO

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MEMBER: AMERICAN POTASH INSTITUTE

RAYMOND ROLLER MILL

15 YEAR RECORD
of
RAYMOND ROLLER MILLS
on grinding
PHOSPHATE ROCK

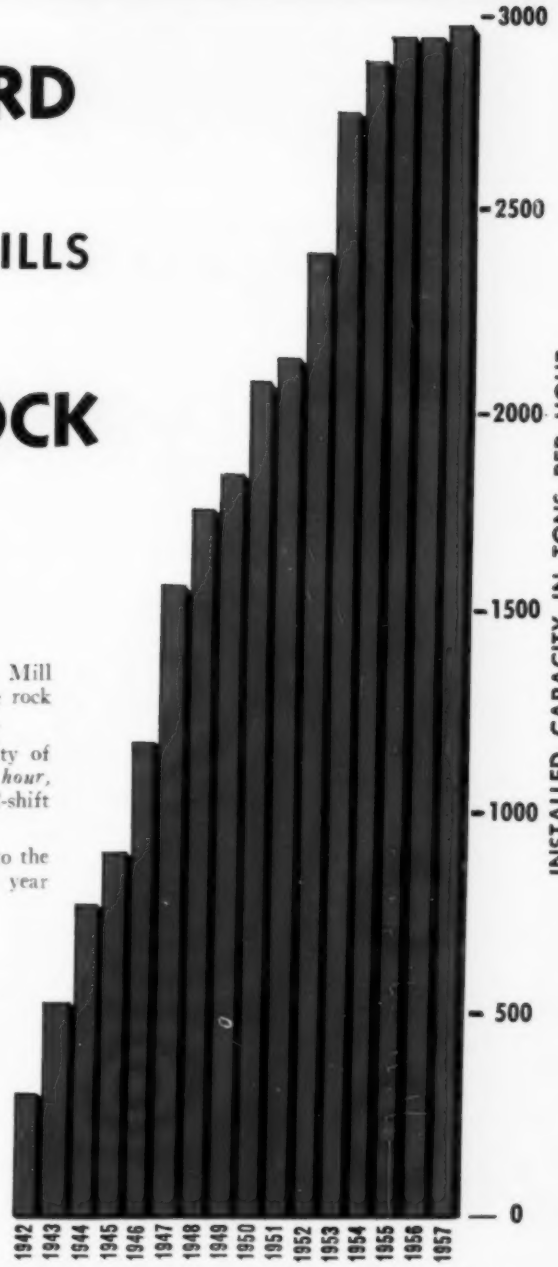
IN the past 15 years, more than 200 Raymond Roller Mill installations have gone into service, pulverizing phosphate rock for acidulation, acid manufacture, and direct application.

As shown by the chart, this brings the installed capacity of Raymond Roller Mills to *nearly 3000 tons per operating hour, or in excess of 16,000,000 tons yearly*, based on 350 2-shift a day operation.

This phenomenal endorsement by industry is mainly due to the following advantages which add up to record economies year after year.

1. Lowest initial cost, power cost, and overall operating costs.
2. Dependable, long service life, backed by over 70 years' experience.
3. Ability to handle all known deposits with a wide range of capacities available.
4. Automatic, dust-free operation with a very minimum of attention.
5. Optimum particle size distribution and ease of fineness control.
6. Ability to dry, grind, separate and convey in one simple operation.
7. Minimum space requirements and flexibility to meet plant layout.
8. Low maintenance.
9. Active research and development over the years by Raymond to further improve grinding efficiency.
10. Competent engineering and operating service.

With a problem in this or a similar field, check the facts and compare. When put to test, Raymond proves best.



YEARLY GROWTH OF RAYMOND ROLLER MILLS
PULVERIZING PHOSPHATE ROCK

COMBUSTION ENGINEERING, INC.

1314 NORTH BRANCH ST.
CHICAGO 22, ILLINOIS

Raymond Division

SALES OFFICES IN
PRINCIPAL CITIES

Combustion Engineering-Superheater Ltd., Montreal, Canada

Fertilizers won't cake—flow freely in the field

Many a farmer has been cursed by the serious caking problem which so often occurs when deliquescent fertilizers are stored in damp or humid conditions. And many a formulator has learned that this can easily be prevented by using Celite*. These tiny particles of diatomite surround the fertilizer crystals or prills with a protective coating that can prevent contact between them and thus minimize caking.

At the same time Celite fillers improve flowability. The particles are not only microscopic in size but extremely irregular in shape. Thus Celite coated fertilizers flow more freely. As little as 2% of Celite assures more uniform application in the field.

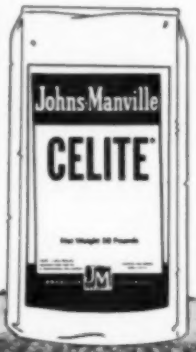
A Celite engineer will gladly help you put the right grade to work in your fertilizer. Just phone him at your nearest Johns-Manville sales office or write Johns-Manville, Box 14, New York 16, New York. In Canada, address 565 Lakeshore Road East, Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

when formulated with

CELITE

diatomite fillers



Johns-Manville CELITE

INDUSTRY'S MOST VERSATILE MINERAL FILLER

LIVESTOCK PARASITES

IT'S during the winter months that biting and blood-drinking lice torture dairy herds and beef cattle.

Easiest, quickest way to control these annoying pests is to treat livestock with Pyrenone* fly spray, either oil-based or emulsion type. It not only rids the animals of flies and lice, but Pyrenone won't show up in milk and meat — even after repeated applications.

For *dry* control of lice, during cold weather, many dairymen prefer to use Pyrenone parasite powders. A decided advantage is the fact that the powders are equally effective against *resistant* rat fleas and roaches in food rooms.

Of course, the best recommendation for cattle grubs is an application of always-dependable rotenone — either as a dust or as a suspension for use in power sprayers. Rotenone also kills irritating lice and ticks.

For complete information on special products — such as, rotenone-*butoxide* emulsions, general purpose parasite powders and Pyrenone liquid dressing for show animals — write the nearest office of Fairfield Chemical Division, Food Machinery and Chemical Corporation. Branches in Principal Cities. In Canada: Natural Products Corporation, Toronto and Montreal.

*REG. U.S. PAT. OFF. F.M.C.

Pyrenone

Putting Ideas to Work

fmc
FOOD MACHINERY AND CHEMICAL CORPORATION

FOOD MACHINERY AND CHEMICAL CORPORATION

Fairfield Chemicals

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3 REASONS WHY YOUR CHOICE SHOULD BE

TREBO-PHOS*

Cyanamid's quality triple superphosphate

1 **GRANULATION**

Trebo-Phos in typical commercial runs is producing high analysis mixed fertilizers with excellent granulation.

2 **AMMONIATION**

Ammoniation easily achieved up to 4.6% and higher with suitable equipment *without* uncomfortable ammonia fumes. Physical condition of Trebo-Phos makes possible maximum and uniform absorption of ammonia.

3 **CYANAMID SERVICE**

Cyanamid's new, ultra-modern triple plant has high storage capacity for Trebo-Phos. Inventories are maintained at levels that let Cyanamid fill your orders promptly. Cyanamid traffic experts are at your service to assure the most prompt, economical deliveries. Cyanamid technical representatives are available to help you solve production problems *in your plant*.

CYANAMID

WRITE, WIRE OR PHONE FOR FULL INFORMATION. OUR REPRESENTATIVES WILL BE GLAD TO CALL. NO OBLIGATION ON YOUR PART.

*TRADE MARK

American Cyanamid Company,
Agricultural Division,
Phosphates Department,
30 Rockefeller Plaza, New York 20, N. Y.

What's Wrong with the Pesticide Industry?

A critical approach to what needs to be done, so the industry may take its proper place in the industrial economy . . .

*by Melvin Goldberg**
Pesticide Advisory Service
New York, N. Y.

IT is not my intent at all to deal with the use or the new uses of insecticides but to give you the results of an observer of the pesticide industry since 1940, and a rather critical approach to what needs be done by the industry in order that it may achieve its proper place in the industrial chemical economy.

I know that some of you may wonder why I have chosen to take this type of an approach but I feel that having had the privilege of serving with this industry since 1940 that it is my right and obligation.

Since the end of World War II, I have been engaged in the industry as a representative of a large national distributor and since 1948 as a complete independent. I have tried always to maintain an objective view of this industry and its practices. This independence started in the hectic and never to be forgotten days of World War II, where as many of you know, I served with the insecticide & fungicide unit of the War Production Board.

Many of our marketing and distribution experts as well as entomologists have become increasingly critical of what is wrong with our industry as we know it. No doubt you all are aware that we are in the midst of a major revolution in our general marketing and distributing patterns.

I would like to discuss briefly and make the point that unless the agricultural insecticide industry, as we know it, starts an aggressive public relations program, both in telling of its importance to the rest of the national agricultural economy and preaching the doctrine of better insecticidal practices to the farmer, we will not maintain the period of growth during the next 15 years that we have in the past 15 years. The industry unfortunately has been characterized by a lack of consistent aggressive sales promotional activity.

DDT producers have been too busy criticizing the other chlorinated hydrocarbon producers, the phosphate people have been criticized by and have criticized the botanical producers as well as the chlorinated hydrocarbon producers, the national distributors complain about the regional distributors, and the farmer, who is probably the least interested in this type of harangue, stands by idly watching and waiting for the best price deal that he can get. Further, the poor consumer or the farmer, is sometimes lulled into a false sense of security by accepting the cheapest method of alleged control rather than paying a bit more in order to get sure control. How can we expect our customers to know and appreciate what our problems are, if we don't really spend time telling them what they are and how we can increase our own markets and profits, and at the same time have the farmer get much better service and much better information.

I should like to set up a straw man to describe to those of you who are not completely familiar with just how the usual new technical material is researched, produced, marketed and then ruined all in a short space of time. So many of our chemical companies have gone thru this practice that it is quite 'old hat' to someone like me. In order that I can draw a lesson and come to the real point of my paper, I am perhaps going to over-simplify some of the time factors involved, but I am certain that you will see the point that I am trying to make.

Introducing a technical pesticide material requires anywhere from 5 to 8 years from the very basic research through market surveys, determination of toxicity data, pilot plant production, determination of marketing procedures, and the best method of distribution—all of these constituting leading of the new chemical to the slaughter. Somewhere along the line, the management committees of our large chemical companies get

* The Agricultural Outlook,—an address presented at the Western Agricultural Chemicals Association, October 15, Villa Hotel, San Mateo, Calif.

hold of all of this work at a rather propitious stage in the development of the new product. The finance committees, the executive committee, and inevitably, sooner or later, the very top management committee gets hold of this product and a decision is about to be made as to how said product will be marketed. At this point, there has been anywhere from a half to one and a half million dollars spent. We have gone through the marketing people, the advertising people, publicity people and are waiting for the answer from the top executive management group of the company.

There ensues the usual time lag while the research and market development people are out telling the various extension services about it. Some rumors creep into the literature, and the farmer starts hearing about the product, demanding delivery. Some of the localized distributors hear about it and maybe even some of the nationals, and before the decision is made, some of the stuff begins to leak out into the market place and a decision is forced by top management. Whether the product would have been better marketed through the nationals or whether it will be marketed through a given number of smaller distributors is all out the window because a hap-hazard method of distribution has already been established and there we have it.

Somewhere along the line, top brass gets into the act and instead of the material being handled in a logical manner, it is suddenly treated as another chemical item as part of the chemical industry, and the age-old practice of chemical sales is established as a policy of the day.

Instead of treating it as a specialty which the agricultural insecticide business is, having its own special specific problems, the product is out and is treated as a caustic soda, a sulfuric acid or some other type of industrial material.

Now the fun begins. Competition determines what the price is going to be and we have perhaps one or two other people who are producing the material. Within a given period of months, we have a first class price war on our hands. Some of the manufacturers whose products have been partially affected by this new product, begin the usual campaign, and we have rumors flying around the industry that this product is no good or is too good. This is generally followed by another price decline, consignment of technical stock, consignment of the semi-formulated product starts, and even consignment of the finished material starts. Some the companies say we are not consigning but we do give harvest time credit, we do give advance billing, but nevertheless the practice is here!

Then the management committee gets back into the act and begins to complain about the profit margins in this particular thing. Therefore, field men are dropped, further research and development are dropped, no advertising is done, and the product deteriorates into a nice vicious circle and we are right back where we started from with nobody actually making any money in the marketing of this product. Next thing you know, executive management says that our company can no longer be in this business. They sell off their inventories, and in liquidating the equipment and the inventory of product that they have, they take a first class shellacking. Stockholders are unhappy and another black mark has been placed against the marketing of an insecticide by a chemical company.

I know that this will bring a smile to many of you since there have been many products that have gone this way and there have been many companies whose executive managements have arrived at these decisions.

Now let's look at how we might have prevented some of this. The products that we sell and hope to sell, are designed for use in the protection of agricultural crops, and modern agriculture is characterized by an enormous trend towards specialization both geographically and on individual farms. Today the old type of subsistence farm is almost a thing of the past. The farmer today is really a business man. He produces those materials for which he is best qualified by reason of weather, labor supply, location or other reasons. His basic motive is always the profit incentive, and he is concerned with producing at the lowest unit cost and selling at the highest possible price.

We who have been in the industry these many years, have not been quite as wise as our customer. We have not educated him into what we are trying to sell. We have not pointed out to him the best method of using our materials. We have not given sufficient public relations to what we are trying to do and why. We have constantly let price be the important factor in many of these things, and have not even sold ourselves to Mrs. housewife or Mr. consumer since we have failed in the necessary justification for large scale control programs such as the Gypsy Moth Control back east in 1957-58.

Many of you undoubtedly feel that we have an overwhelming public relations job to be done. Yes, that is true, but when you realize that we have but very few customers, probably not over a million and a half, our problem could be quite simple. Let me show you why.

The census bureau tells us that there are approximately four million eight hundred thousand farms, of which the distinction is made between the 3,300,000 commercial farms and the 1,500,000 other farms composed primarily of residential, subsistence and part-time farms. Now, the commercial farms reporting sales of $250 to $5000 per year amount to over 43% of the total number of farms, but ac-

count for only about 22% of farm products sold. There are only a little over 1,200,000 farms or 25% of the total that report sales of $5000 or more, and these account for 75% of the total value of all farm products sold. Only about 10% of the total number of farms report sales of $10,000 or more and these account for about 50% of the total value of all farm products sold.

In addition to this specialization, let's take up the matter of geographical specialization which is even more striking and will serve the purpose that I have in mind.

Many of the statisticians in our industry have shown us that almost a third of all grapevines are in one county in one state, and almost a third of all pear trees are in three counties in one state. Three counties in one state in 1954, for example, had 10% of all apple trees and produced 20% of all apples harvested. A more striking tendency is the fact that during the period 1949 to 1954, the total number of apple trees declined from 50 million to 31 million, and the apples harvested declined from 130 million to 109 bushels, while during the same period the number of apple trees of all ages increased from 2.7 million to over 3 million trees in the three counties referred to.

An even more striking example is cotton production in the irrigated valleys of California, New Mexico and Arizona, which have shown an increase since World War II from a negligible amount of about 22% of the total cotton production. It is easy to see, according to many in the industry, that within the foreseeable future that the same states will be producing at least 75% of our total cotton crop by 1975, or earlier.

The point of these statistics is that our public relations program which I am advocating, then narrows itself down to the overall education program to be used entirely in the concentrated areas which are referred to and makes our problem that much simpler in terms of its day to day application by the industry itself. I know that the public relations fellows will be horrified at my over-simplifying this, but I am simply trying to make my point and using these statistics to back this point up.

Our sister industry, the fertilizer industry, realized this problem a long time ago and has taken steps to solve it. We can take a good lesson from them since their progress during the past 15 years has been probably more spectacular than ours in terms of technicological developments and complete and utter change in methods of operation, and method of changes in marketing patterns. As many of you know, the National Plant Food Institute is a consolidation of two trade associations in the fertilizer industry and under the progressive leadership of the new group, an entire new program has been established. This program was instituted in 1954-55 and is just beginning to bear fruit. A very concise summary of their activities and program follows.

Essentially, the institute has established 6 regional offices with a director placed in charge of each of these offices. These regions vary greatly in load and geographical size, and it appears that they have been organized primarily along lines dictated by trade practices and college groupings. In the areas of heavier load, district representatives are assigned to assist regional offices. For example, in the midwest, there will be three district representatives; one located at Kansas City, Missouri; one at St. Paul and one at Columbus. The institute and its predecessors have based their work on cooperation with existing state and federal research and educational agencies, particularly the land grant colleges. The objective has been to work cooperatively with such groups to the end that the objectives of both industry and professional agricultural workers are fulfilled, with a resultant benefit to agriculture in general.

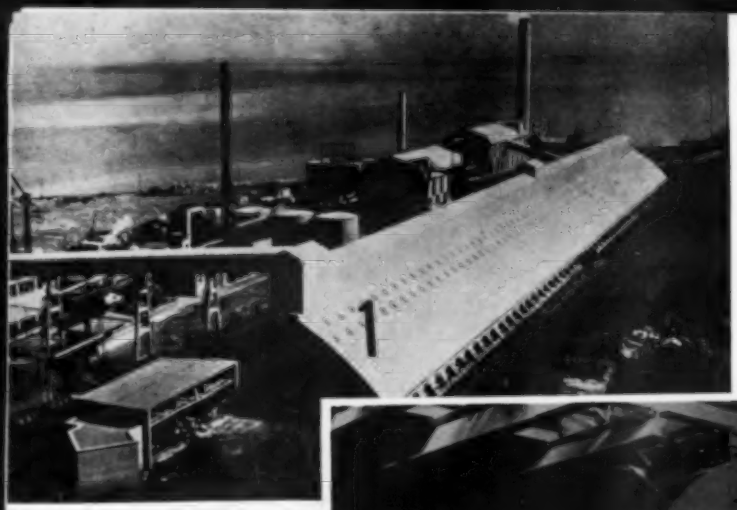
The institute has broadened its liaison so as to work more closely with agricultural economists, farm managers and farm management specialists, bankers, related agriculture supply industries and many other similar groups. The entire program is rooted in research and education, and research grants and support of both graduate fellowships and undergraduate scholarships are made. In adopting its most recent program, advice was solicited from the activities to be followed from land grant college representatives throughout the country. In general, the future plans are based on increasing the use of fertilizers by stimulating more work in economic analysis of fertilizer usage, more research as to the optimum economic levels and the right combination of plant nutrients, relationship between moisture conservation and fertilizer usage, and, of particular importance to the west, research in forest and range fertilization, and the evaluation of educational tools as they can affect proper fertilizer usage.

The best example of the type of activity that we should begin to follow is illustrated by the fertilizer promotional activities, and we in this industry can take a page from their book. I know that many of you will say that the tonnages involved in the fertilizer industry are much greater than ours. You will also say that the fertilizer industry is much older, but as you know, even it has gone through many changes in the past several years, probably equal to or greater than the changes in the pesticidal field.

However, we know too that the distributional and marketing patterns are not dissimilar and the pesticide industry can learn by experience from what the National Plant Food Institute has done in their new promotional program.

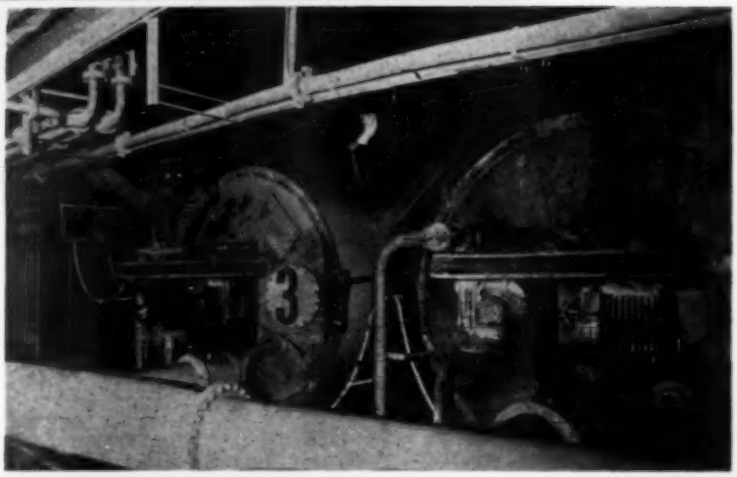
To date, it has not been possible to evaluate completely the effectiveness of this program since

(*Continued on Page* 106)



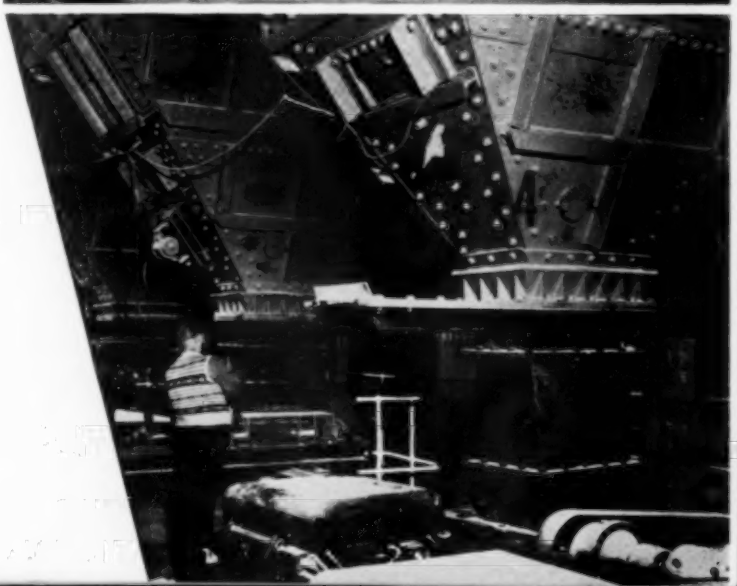
FERTILIZER

EARLIER this year, Scottish Agricultural Industries, Ltd., inaugurated a new 8.5 million dollar plant at Leith, Scotland, for the production of ammonium phosphate based complete fertilizers. The plant has a capacity of 150,000 tons per year, and includes three main process units: sulfuric acid production, phosphoric acid production and a fertilizer production section. The fertilizer section was designed by Dorr-Oliver, Inc., Stamford, Conn.



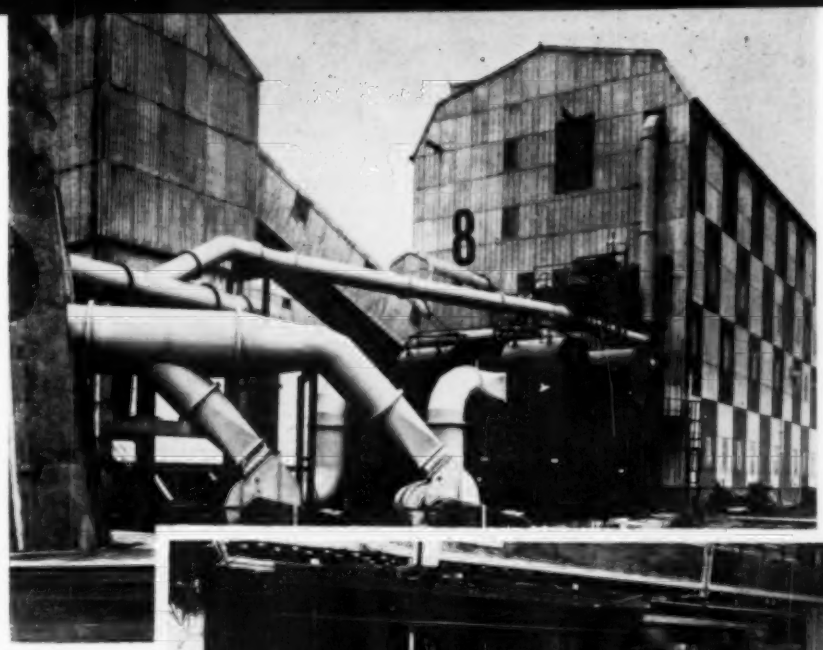
Phosphoric acid is produced by the wet process with a strength of 30-32%. It is concentrated to 31-37% for use in the granulation section. The phosphoric acid is combined with ammonia (obtained by distillation of synthetic by product ammonia liquor containing 20-32% NH_3) to form a slurry.

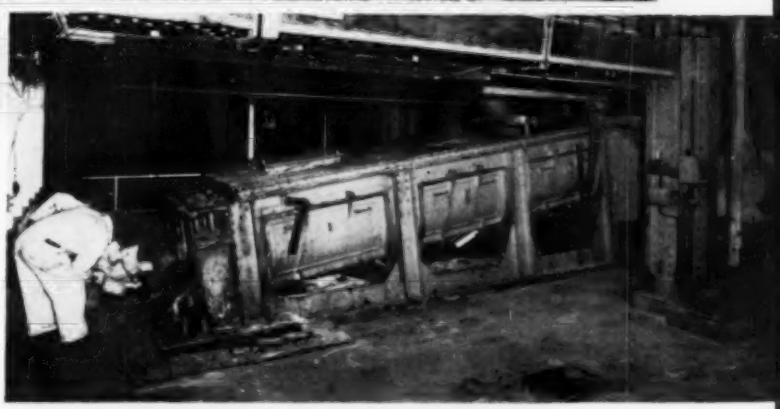
The slurry is combined with ammonium sulfate and also potash (as muriate of potash with 60% K_2O). Since the moisture level in the slurry is too high for proper granulation, a recirculating load of dry material is carried in the system. The recycle is composed of crushed oversize, and fine material from the screening stage. The slurry and the recirculating dry solids meet in a "blunger." Granulation is effected by coating the dry particles with slurry, and binding together the small particles. From the blunger, the material passes to a drier, then to a screening section, and finally to storage or bagging.



PRODUCTION

In a New Plant for SAI, Ltd.



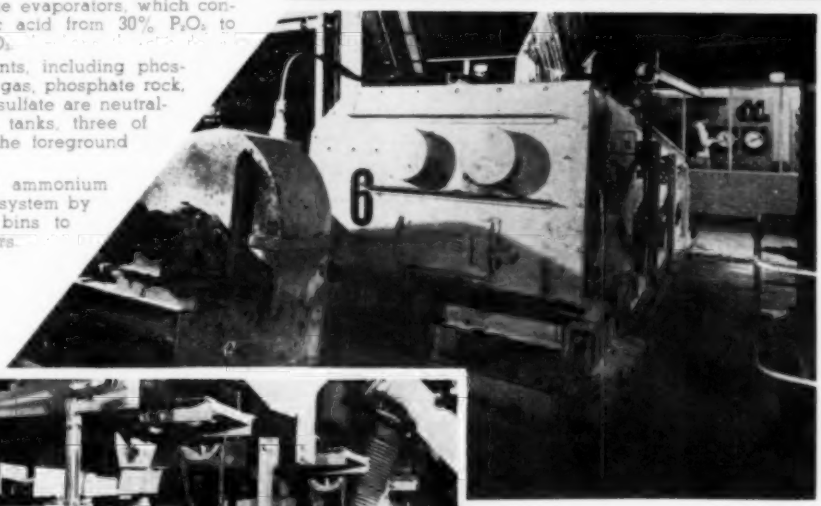


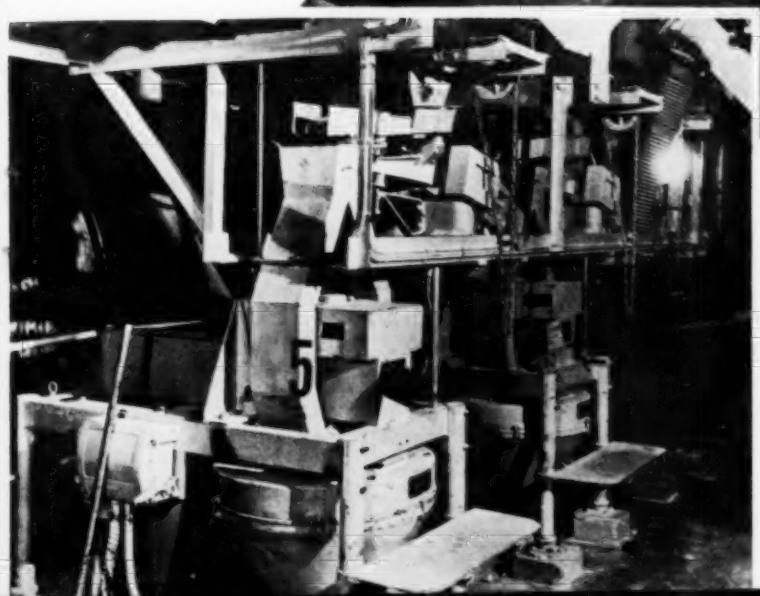
(1) General view of the newly completed 8.5 million dollar concentrated fertilizer plant of Scottish Agricultural Industries, Ltd., at Leith, Scotland. Designed to produce 500 tons per day of ammonium-based complete granular fertilizers, the plant comprises three major processing sections. The fertilizer section, designed by Dorr-Oliver, Inc., is housed in the checkered building in front of the large stack at right. Other sections produce both sulfuric and phosphoric acid.

(2) Phosphoric acid is metered to the reaction system by a Howard Acid Feeder (shown at top). At the left is one of the heat exchangers serving the evaporators, which concentrate phosphoric acid from 30% P_2O_5 to as high as 37% P_2O_5.

(3) Fertilizer ingredients, including phosphoric acid, ammonia gas, phosphate rock, and solid ammonium sulfate are neutralized in four reaction tanks, three of which are shown in the foreground of this photograph.

(4) Potash and solid ammonium sulfate are fed to the system by gravity from storage bins to constant weight feeders.





(5) Solid ammonium sulfate after metering through constant weight feeders is ground to the required size by Entoleter mills.

(6) In the Blunger, shown above, slurry from the reaction tanks is mixed with recirculated fine granular fertilizer and crushed oversize product as well as with potash, solid ammonium sulfate and filler material as required.

(7) Another view of the Blunger. Plant control room is visible in background.

(8) Gas from the rotary drier in which granulated product is dried is cleaned in a battery of Doyle scrubbers. These scrubbers handle approximately 75,000 cfm of exhaust gases from which virtually all dust and fumes are removed prior to discharge to atmosphere.

Emulsifiers

for the Agricultural Chemicals MANUFACTURER

A Report on Toximuls

By Stepan Chemical Co.
Chicago, Ill.

THE trend toward matched pairs of emulsifiers continues to grow, and Stepan is offering two such pairs this year. Toximuls 102-103 are probably the widest range pair on the market, giving excellent emulsification of all chlorinated insecticides and also the 2, 4-D and 2, 4, 5-T ester herbicides.

Another pair recently introduced are called Toximul A and Toximul B. This pair is designed for use with chlorinated insecticides and many of the phosphates. Excellent emulsions of toxaphene, DDT, aldrin, dieldrin, parathion, etc. are obtained. Toximuls A and B are in a lower price range and offer interesting economies.

The use of emulsifier pairs makes possible very close control of emulsion performance in all types of water and with different solvents. A special emulsifier pair was developed, for example, to meet the very critical specifications of the huge Egyptian toxaphene contract, in which Stepan emulsifiers were used.

For companies where a limited line of formulations makes it impractical to stock a pair of emulsifiers, Stepan offers Toximul 500 or Toximul 600, — both of which are versatile, general purpose emulsifiers. Using either one of these products, it is possible for formulators to produce very adequate emulsifiable concentrates of a variety of insecticides, even with unskilled plant operators.

The phosphate insecticides differ in their emulsifying requirements from other types, so a special group of emulsifiers has been developed for maximum performance with this class. For malathion, Toximul MP has been found to give excellent performance. Parathion does best with Toximul P. and methyl parathion with Toximul Q. As indicated previously, however, adequate performance can also be obtained with Toximuls A and B in combination.

Although the trend is away from nonionics in most cases, there are a number of special herbicide and phosphate formulations where nonionics are still being used, and Stepan offers the Makon B series of nonionics as unusually low priced products for these applications.

A Report on Emcols

By Emulsol Chemical Corp.
Chicago, Ill.

THE Emulsol Chemical Corp., Chicago, has added a substantial number of new agricultural emulsifiers to its line. These have been developed in response to problems arising from the use of new techniques and new pesticides in the agricultural industry. Among these are the following:

For 2,4-D ester emulsifiable concentrates, Emcol H-710 and Emcol H-712. These emulsifiers are specifically designed for formulating low-foaming herbicide emulsifiable concentrates, and to minimize sludge separation in the finished concentrate.

Emcol D3-26 for toxaphene formulations based on heavy aromatic naphtha solvents. There has been a trend toward the use of heavy aromatic naphtha solvents for toxaphene formulations. These solvents, which contain alkylated aromatic fractions, respond to emulsifiers differently than do xylene range solvents, and require the use of a special emulsifier.

For liquid pesticide-liquid fertilizer mixtures, Emcol H-A, Emcol H-B, and Emcol H-C. The recent practice of mixing liquid pesticide concentrates with liquid fertilizer for field application has required the development of these particular emulsifiers, which have a high tolerance to the heavy salt concentrations of the liquid fertilizer.

Emcol H-300X and Emcol H-500X, a potent set of emulsifiers represent the "matched-pair" approach to pesticide emulsification. Blends of these two emulsifiers will effectively handle a wide variety of chlorinated hydrocarbon, and organic phosphate pesticides. In the

past year, it has been found that blends of Emcol H-141 with Emcol H-300X provide wide flexibility in the formulation of many organic phosphate pesticides at different concentrations.

For spreader-stickers, Emcol 14 and Emcol H-A. The unique salt tolerance of Emcol H-A permits its use as a spreader, to reduce surface tension and improve leaf wetting, in herbicides of the inorganic salt solution type. Emcol 14 is an oil soluble, water dispersible emulsifier which may be added to pesticide concentrates to improve leaf wetting.

A Review of

EMCOLS • TOXIMULS

AGRIMULS • SOLE-MULSE

TRITONS • ATLOX

For pentachlorphenol emulsifiable concentrates, Emcol C62-06C and Emcol C62-06D. These emulsifiers have been developed specifically for 15% and 40% pentachlorophenol concentrates, respectively, for use in defoliation.

Emcol D2-46 has been specifically developed for Tabutrex concentrates, and Emcol H-44C has been recommended recently for synergized pyrethrum concentrates.

A Report on The Tritons

By Rohm & Haas Co.
Philadelphia, Pa.

A new pair of Triton emulsifiers offered by Rohm & Haas will give improved emulsion stability over a range of water hardness. These new emulsifiers will also provide greater versatility to accomodate variations in the composition of solvents and technical toxicants. Properly blended, these new Tritons will impart excellent spontaneity and emulsion stability to a very broad range of agricultural chemical formulations. Storage stability characteristics are outstanding. The finished emulsions will have a lesser tendency to foam in the spray tank.

Rohm & Haas will continue to supply the widely used Tritons X-131, X-151, X-161, and X-171, although they will be replaced in part by the newer Tritons.

Tritons X-155 and B-1956 are straight nonionic emulsifiers which have application in certain specialty products, and in standard formulations where maximum performance and storage stability and low sensitivity to water hardness are desired.

Tritons X-100, X-114, and X-102 are lower cost nonionics, which are used alone or in blends with anionic surfactants.

Triton X-45 is recommended for the emulsification of refined agricultural oils.

Triton X-120 is a dry surfactant used as a general purpose wetting agent for wettable powders. Tamol N and Tamol 731 are excellent dispersing agents in many wettable powder formulations.

A Report on Agrimuls

By Nopco Chemical Corp.
Newark, N. J.

FOUR pesticide emulsifiers, three of them new products, have been featured by Nopco Chemical Company this year. Known as Agrimuls, the products are designed to handle a wide range of toxicant problems.

Among the new Agrimuls, blends of Agrimul N4R and Agrimul N4S will function as versatile emulsifiers for the thiophosphate esters, such as malathion, parathion, and methyl-parathion, and for the herbicidal esters of 2,4-D and 2,4,5-T acids. The concentrates obtained have good storage and emulsion stability.

Also new is Agrimul N5Y, an economical emulsifier that is effective for chlorinated hydrocarbons, such as toxaphene, chlordane, and DDT.

The fourth product is Nopco's best-selling emulsifier, Agrimul 70-A, which has demonstrated for a number of years excellent versatility and outstanding stability for a

(*Continued on Page* 120

A Report on Atlox

By Atlas Powder Co.
Wilmington, Del.

BECAUSE of the long periods of testing and time required for thorough field testing, Atlas Powder Company is not willing to announce new materials for the agricultural chemicals industry at this

(*Continued on Page* 120)

A Report on Sole Emulsifiers

By Sole Chemical Corp.
Chicago, Ill.

THE 1958 season was a "proving ground" period to establish the field acceptance of the "multiple use" versatile pair of emulsifiers, Sole Mulse TA and TB. A third emulsifier, Sole-Mulse T-6, more specifically for malathion - parathion concentrates, also performed exceptionally well.

It is expected that a number of new and unique emulsifier improvements, in final development stages, will be commercially available prior to the 1959 formulating season.

The wetter-sticker, Sole-Onic PGO, used in field additions principally in the orchard and other fruit and vegetable crop spraying, has also found acceptance in water-containing aerosol emulsion stabilization and corrosion control.

For the dust and wettable powder producers, the Sole-Amite AG, agricultural grade diatomaceous silica, has been found very effective and economical.

(*Continued on Page* 113)

Handling Fertilizer Liquids

THE fertilizer industry does not have a particularly good safety record. For example, last year it was third lowest, with 8.27 disabling injuries per million man hours exposed. The average for the chemical process industries is 3.55 injuries per million man hours exposed; look at the room for improvement. The fertilizer industry cannot use extreme hazard as an excuse for this record; consider high explosives with a frequency of 1.34, and fuses and explosives with a frequency of 1.92. Theirs is an extremely hazardous business and, consequently, they take safety seriously. Evidently, effort and attitude towards safety are more important than the nature of the operation.

Why should the fertilizer industry rate so high in accidents? Primarily because of attitude; safety is not taken dead seriously. First, too many fertilizer plant personnel seem to be in too much of a hurry to take a little extra time to be safe. There is often an attitude of manliness attached to neglecting safety precautions. I have actually seen men who have developed a tolerance to strong ammonia vapors, seriously kid and razz others for not being able to take it.

More important than anything I can say about specific safety practices, is this problem of the proper safety attitude. The finest pair of goggles in the world is not worth a penny if a man is in too much of a hurry or considers himself too brave to put them on.

If there is one thing I want to get over about safety in handling liquid raw materials in fertilizer plants, it is the protection of the eyes. With his eyes protected, a man is much more likely to come out of any emergency relatively safely. Without eye protection, the hazards of any situation are greatly increased. It is bad enough to try to get out of the vicinity of a discharging relief valve while holding your breath, without also having to do it from memory with your eyes closed.

Now then, let us go into some of the details of handling liquids with safety. First, let us start with unloading a tank car or truck. Number one is a safe place to make connections. This should consist of more than a spot on the track that a pipe and hose reach to. With that kind of arrangement, the danger of breaking your neck becomes the greater hazard. Many fertilizer plants would do well to improve on their facilities for connecting tank cars. For real safety, a tank car unloading platform should be installed, and there should be at least one safety shower for every two tank car stations.

There should be an established procedure for connecting and disconnecting tank cars, that everyone knows about. For example, if warning signs are always put up, the brakes are always set and the wheels are always blocked, there is little chance that a tractor operator will move a connected car even if inadvertently ordered to. This may seem like a minor point to bring up; however, broken connecting hoses occur more frequently than they should. Moving a tank car and thus breaking connections, is not only a serious hazard to anyone who might be in the area, it is also a poor way to develop public relations.

Next, let us consider how the liquid is taken out of the tank car. Most plants use air pressure on nitrogen solution and on acids. This has been considered acceptable in the past, if proper precautions are taken. A direct connection between the air line and tank car is not proper precaution. The following items should be attached to the air line. A water and oil separator, a shut off valve, a pressure reducing valve, a pressure gauge, a safety valve and a tee with a valve on the side. The water and oil separator is more of a necessity on acid tank cars than on nitrogen solution cars, because water added to an already full acid car will give off heat and could develop excessive pressure in the tank car. The shut off valve should be located on the unloading platform, so that the air can be turned off without going out on to the tank car dome. The pressure reducing valve should be set at 30 lbs. per square inch for all tank cars, except medium and high pressure nitrogen solution cars. The pressure gauge is desirable as a warning in case the safety devices fail. The safety valve would be set to pop off at 1 or 2 lbs. above the pressure reducing valve. With a pop off valve, the tank car is protected in case the pressure reducing valve fails. Next, a check valve should be provided; then, even if the compressor is turned off and the valve left open, ammonia vapor will not get back to the compressor. The tee and valve are installed to bleed air pressure off a car prior to disconnecting. Caution: be sure that the check valve is between the bleed valve and compressor. If the check valve were between the bleed valve and the tank car, there would be no way of safely releasing pressure on the tank car.

with Safety*

by Larry Lortscher
Spencer Chemical Co.
Chicago Illinois

In some plants, more than 30 lbs. per square inch is needed to unload nitrogen solution tank cars. In these cases, two of the above described sets of air line fittings should be used. If only one set of fittings is used for unloading acid tank cars at low pressure, and nitrogen solutions tank cars at medium or high pressure, the safety pop off valve would have to be adjustable. Adjustable fail-safe equipment is, generally, not the absolute safety device that it should be. You could never be sure that someone did not forget to set it back down to 30 lbs. per square inch for a low pressure tank car.

Low pressure tank cars bring up another item for safety discussion; gagging tank car relief valves. This is not a good practice. It is especially poor practice if the air line fittings I described above are not being used. If the nitrogen solution must be moved at high pressure, it would be much more satisfactory to use a liquid pump to deliver the nitrogen solution.

There are a number of safety items to be stressed about piping liquid from tank car to storage or to processing. First, the pipe must be strong enough for the job. For anhydrous ammonia, this means schedule 80 pipe. For solutions and acids schedule 40 pipe is satisfactory as far as pressure is concerned; but if using steel pipe one wants schedule 80 for a corrosion allowance. Because of this corrosion in steel pipe, periodic inspection is desirable.

Welding, cutting, heating or using liquid pipe lines for a welding ground is very dangerous. The residual ammonia in a pipe line could have the proper amount of air to burn, when heated. Almost always, there will be ammonium nitrate in the nitrogen solution pipe lines, especially in the corrosion scale and in the threaded joints. This nitrate will burn and give off enough gas to cause pressure explosion. In the case of a badly corroded pipe, the pressure developed may rupture the pipe near the point of heat and at joints, resulting in a face full of scale for the welder. If, for some reason, putting heat on the pipe is unavoidable, the pipe must be flushed thoroughly with water, and must be opened up to prevent pressure build up. The welder must have protection, especially for the eyes, face and hands against flying solid particles of scale.

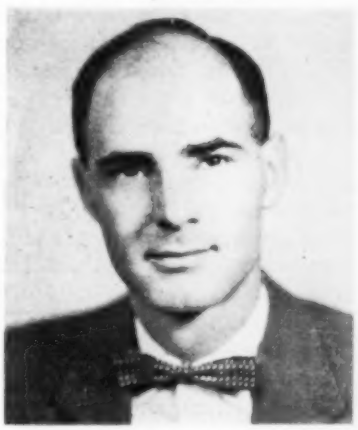
Whenever an air line or water line connects with a nitrogen solution or acid line, the air or water line must have a check valve. Even air into water needs a check valve to prevent water getting back into the air line. A slug of water coming out of the air line into the acid line could develop a steam pressure and endanger workmen, especially around the ammoniator. Acid or nitrogen solution in the air line could cause some serious burns when the personnel proceeded to blow dust off themselves. Building codes in your area, should be checked for specific restrictions and instructions concerning the cross connections of chemical lines with the main water supply.

Any time that liquid can be isolated between two valves (do not forget check valves either) someone should stop and consider if a safety hazard is being created. In the case of anhydrous ammonia, the co-efficient of expansion is large enough and the hazard in case of a ruptured line is great enough, that a relief valve must be installed between shut off valves. Also, the relief valve must be vented to a safe place. If there is a heater on an acid or nitrogen solution line, there definitely should be a relief valve, if this section can be closed off.

If aluminum lines are used for nitrogen solution, they should be protected on the outside from phosphate dust. Phosphates will react rapidly with aluminum and develop pits in the pipe line. If plastic pipe lines are used, they should be protected from severe vibration or shock, which can break them.

Storage, like pipe, must be picked for the job and inspected regularly. In the case of a storage tank, the liquid should be moved to process by a liquid pump. The chance for a pressure explosion on a corroded steel tank, when using compressed air, is too great.

Larry Lortscher



*Address presented at the Fertilizer Safety School held in Chicago Illinois, September 10, 11.

Storage tanks must have pressure relief valves and also vacuum breakers. In the case of acids stored in steel tanks, hydrogen gas is released as corrosion takes place. A pressure could be built up that could rupture the tank. The possible presence of hydrogen should never be forgotten—it is extremely explosive when mixed with air. When a nitrogen solution tank is being filled, it will generally need venting. The vent should be piped to a safe place. It can be vented under water, and then be flushed away or hauled away. If a vacuum breaker is not installed on an acid or nitrogen solution storage tank, one could end up with a collapsed tank. Anhydrous tanks, of course, are designed to stay completely closed off.

Extra precautions must be taken in inspecting or repairing storage tanks. They must be flushed out to get rid of any ammonia vapor or hydrogen gas. The flushing must proceed long enough to dissolve all of the acid or ammonium nitrate in the corrosion scale. If there is any residual acid, hydrogen could be formed while the tank is being repaired, and could result in a terrific explosion. If welding or cutting is required in the tank, it should be steamed out first. Properly done, steam cleaning will insure that there are no pockets of hydrogen remaining in the tank. Tank cleaning and repairs should never be undertaken by one man alone.

Now, we have the liquid raw materials up to the point of use. The ammoniator operator is the man most concerned with the safe end use of the liquid raw materials. Previous articles and talks have pointed out the dangers involved in improperly using both acid and nitrogen solution in an ammoniator. You are all aware that excessive use of acid, and poor distribution of acid and solution inside the ammoniator can result in flash fires. Such improper operation will also result in loss of nitrogen and air pollution problems.

The ammoniator discharge end needs to be open and well lighted, so that the operator can easily see the bed action in the ammoniation section, without sticking his head in. If he cannot see what is taking place inside the ammoniator, the bed could become wet and stagnant, resulting in a fire hazard and also in acid forming a blow hole and splattering the operator.

One very effective way to protect the operator from being splattered by an acid blow is to keep him out of the line of splatter. For example, if an ammoniator turns counter clockwise (looking at the discharge end), the fertilizer bed will be on the right side and an acid blow will shoot over towards the left side. Now, if the operator's station is laid out so that it is more convenient to stand at the right side to observe, he is not likely to be hit by any acid spray. The operator still wants to be able to observe from the left side, but he should not get as close.

The operator's station should be designed so that he can get away in almost any direction. He should also have easy escape to the outside or a room or stairwell that is supplied with fresh air. Two safety showers, in different locations, for the ammoniator operator's use, will increase his chance of being able to wash himself off.

Emergency equipment to protect the worker from any hazard arising from using acid, nitrogen solutions and anhydrous ammonia, must be near the point of need, in good repair and clean. An ammonia face mask in the office is almost worthless in an emergency in the plant. Every man should have chemical goggles, and every man should be convinced to wear them when connecting tank cars or working on pipe lines. In the case of acid, a felt hat and rubber gloves are pretty good protection.

Every plant should have a self contained breathing apparatus for emergency use. For example, if a pipe line should burst, and a man be knocked unconscious, complete protection would be needed for the rescuer. Self contained breathing apparatus, or an air line mask is recommended for internal tank inspection. For inside tank work, a rescue harness is recommended also. Then, if something should happen to render the man unconscious, he can be withdrawn quickly.

Next, let us consider the safety aspects of specific liquid raw materials. Anhydrous ammonia is stored as a liquefied gas, which, at normal temperatures results in pressures as high as 300 lbs. per square inch. This, of course, means that equipment must be designed for pressure. Relief valves are required on tanks and should open at 250 lbs. per square inch. Since a relief valve should never have a shut off valve between it and a tank, a dual relief valve system is desirable so that the valves can be inspected and repaired without emptying the tank. Whenever sight glasses are used, excess flow check valves should be installed to prevent complete emptying of the tank in case a sight glass is broken.

Ammonia is extremely volatile and noxious. Being detectable in small quantities, a man will generally get out before he gets the lethal dose. A man can smell 50 to 100 parts per million of ammonia in air. It takes 5,000 to 10,000 parts per million (½ to 1%) to be instantaneously fatal. This is about one to two pints of liquid anhydrous ammonia, when allowed to evaporate in a closed room 30 ft. long by 10 ft wide by 10 ft. high. The best remedies are fast washing for external contact, and use of oxygen in case of an excessive amount in lungs. Oxygen should be administered only by trained personnel. It is fortunate that ammonia vapor is light, which makes natural ventilation very effective in carrying off the fumes.

Liquid ammonia has a high co-efficient of expansion. This, coupled with its volatility, makes it necessary to use a relief valve at any point where liquid ammonia can be trapped. Sight glasses should

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SOIL FUMIGATION

a new and expanding market

by H. L. Haller

U.S.D.A., Washington, D. C.

Report presented at the National Agricultural Chemicals Association Convention
Savannah, Ga., October 31

SOIL fumigation has been practiced for a long time. The early work was directed primarily toward destroying soil-inhabiting insects and to a lesser extent nematodes. Probably the first soil fumigant to have widespread use was carbon disulfide. It was employed to kill the grape phylloxera, a root louse that was threatening the grape industry in France. Late in the nineteenth century carbon disulfide was found to be effective against wireworms. It was recommended for use against soil insects until recently when it was largely displaced by the chlorinated hydrocarbon insecticides. Other early soil fumigants were naphthalene and paradichlorobenzene, the latter still being used to some extent for peach tree borer control.

Two developments have resulted in wide explorations of this important field by scientists in both public and industrial research: (1) recognition that soil fumigants are also useful in controlling noxious bacteria, fungi and weed seed; and (2) the rather recent realization of the crop losses caused by soil inhabiting pests. Also it is no longer possible for farmers to abandon infested soils and move to new lands. As agricultural soils are cultivated more continuously and intensively, some soil treatment often is needed to keep the microflora in balance and offset the unfavorable effects on plants of the growing complex of pathogenic soil organisms.

Soil fumigants may be either solids, liquids, or gases. A number of factors besides their toxicity to a soil organism are important for their commercial utility. Distribution and diffusion of fumigants in different soils is quite variable. Some are absorbed much more readily than others. For example, chloropicrin which is 14 times as toxic as carbon disulfide to insects in laboratory soil is only twice as toxic in the field. Allyl isothiocyanate is 29 times as toxic in laboratory soil as carbon disulfide, but has about the same toxicity in the field. The greater toxicity of carbon disulfide in the field is due to its ability to diffuse and its small loss by absorption in the soil.

Other factors important in the effectiveness of a soil fumigant are soil structure, moisture content, temperature of the soil, and the uniformity and depth of application. In some cases the efficiency of a soil fumigant is dependent upon retaining it in the soil by means of an appropriate cover — cloth bags, polyethylene or a "water seal." At other times, it may be desirable to have a fumigant that leaves the soil quickly so as to be harmless to subsequent plant growth.

Although soil fumigants were first used to control soil-inhabiting insects and are still used in sizeable quantities for this purpose, the greater potential use today is for control of root rotting organisms, nematodes, and weed seeds. Soil fumigation has been most successful in controlling nematodes. Treated areas have increased from a few experimental plots in 1928 to an estimated half million acres of field soil and several million square yards of seedbed greenhouse and nursery soil in 1957. By far

H. L. Haller

the greater part of this development has taken place in the last ten years. Tobacco, pineapples, and vegetables are the principal crops treated.

For seedbeds such as those used for starting tobacco, tomatoes, ornamental shrubs and other transplants, soil fumigation or any other chemical treatment should be effective against a variety of organisms. Damping-off and weed seeds are notoriously serious in many row crops as well as in seedbeds. A soil treatment that will kill weed seed and thereby eliminate the cost of weeding may effect savings that more than pay the cost of even an expensive chemical.

Of the several commercially available soil fumigants the most important are ethylene dibromide, a dichloropropene - propane mixture (DD mixture), 1,2 dibromo-3-chloropropane, methyl bromide and chloropicrin. It is estimated that in 1958 ethylene dibromide, the DD mixture, the dibromochloropropane and methyl bromide were used on about 700,000 acres.

(*Continued on Page* 108)

Program

FERTILIZER INDUSTRY ROUND TABLE

November 5, 6, 7, 1958

Mayflower Hotel — Washington, D. C.

WEDNESDAY, Nov. 5

Sessions: 10:00 a.m. to 11:30; 2:00 p.m. to 4:30

Economics of Preventive Maintenance—10 Questions

Brief review of Round Table meetings.....V. Sauchelli

Engineering Principles Governing Maintenance

Discussion Leader .....Jesse C. Jensen

Discussion of pertinent questions and problems by selected members.

LUNCH

Discussion of problems associated with main theme by selected members.

THURSDAY, Nov. 6

Sessions: 9:30 a.m. to 11:30; 2:00 p.m. to 4:30

Economics of Processing—14 Questions

General Principles of the Economics of Processing

Discussion Leader.....George F. Sachsel

Superintendent's Responsibility in Plant Operation Time Table.

Discussion by selected members of questions and problems pertinent to the theme.

LUNCH

Union Bag-Camp Study on Bagging and Bags....W. F. Jacobi

Discussion of theme problems by selected personnel.

FRIDAY, Nov. 7

Sessions: 9:30 a.m. to 12:00 Noon; 2:00 p.m. to 3:00

Economics of Formulation—13 Questions

Principles Governing Economics of Formulation

Discussion Leader.....Frank T. Nielsson

Discussion of questions by appointed members.

Economics of FORMULATION— PROCESSING — MAINTENANCE—

... highlight the annual meeting of the

FERTILIZER INDUSTRY ROUND TABLE

THREE basic phases of fertilizer production highlight the annual Fertilizer Industry Round Table program, being held November 5-7 at the Mayflower Hotel, Washington, D. C. Some 3-400 fertilizer production personnel, guests and other members of industry will review questions dealing with the: economics of preventive maintenance, economics of processing, and economics of formulation. The overall program is outlined above, and specific questions for the 3-day session appear on the facing page.

These questions for discussion were submitted over recent months by various members, and deal with typical problems and situations being encountered in the plant. An exchange of ideas on the various situations offers participants the benefit of experience in different plants involving similar or related problems.

Chairman of the Fertilizer Industry Round Table, is Vincent Sauchelli, technologist with the National Plant Food Institute. H. L. Marshall, Olin Mathieson Chemical Corp., is secretary-treasurer. Members of the executive committee of the group include Dr. Sauchelli, Mr. Marshall, J. E. Reynolds, Davison Chemical Co., and A. Spillman, manager, Fertilizer Manufacturing Coop., all of Baltimore, Md.

Registration for the meeting will start Tuesday, November 4th, between 7 PM and 9 PM, in the Mayflower Hotel Lobby. Sessions will start at 10 AM on Wednesday, and 9:30 on Thursday and Friday. Ample time will be allowed following each discussion period to take full advantage of comments from all members attending the meeting. A short business session will take place during the course of the 3-day round-table.

Officers and executive committee of the Fertilizer Industry Round Table (l to r) vice president, James Reynolds, Davison Chemical Co.; secretary-treasurer, H. L. Marshall, Olin Mathieson Chemical Corp.; president, Vincent Sauchelli, National Plant Food Institute; and executive committee member, Albert Spillman, Fertilizer Manufacturing Cooperative.

Economics of Preventive Maintenance

1. What is a formula for balance between maintenance, labor cost and equipment replacement?
2. Will the cost of a good preventive maintenance program be justified when it produces a minimum amount of "Down Time"?
3. What are the proven materials, available on the market today, to reduce corrosion in the ammoniator section of the production system?
   What are the best designs for:
   Belts, Structural members, Pipes, Valves, Hoppers, Castings, Continuous Weighing as related to corrosion, ease of operation and maintenance.
4. A discussion of preventive maintenance as relates to fast efficient means for cleaning granulation equipment such as the ammoniator, dryer, chute pulverizer, etc.
5. Will a dust collecting system pay in preventive maintenance and operation costs?
   Discuss economics of a dust collection program throughout a fertilizer plant; that is, granulation system, elevators and shipping mills.
6. What are the economic advantages of temperature control of liquids in processing?
7. Discuss a volume displacement meter such as the Bowser stainless steel meter for handling nitrogen solution and phosphoric acid. Emphasize economics.
8. How do you calculate area-type flow-meter correction factors for a change of specific gravity?
9. What is a good method of adhering Teflon to metal?
10. A discussion of instrument developments for the fertilizer industry.

Economics of Processing

1. What equipment provisions can be utilized to prevent material from setting up on the interior of a cyclone-type dust collector?
   Describe and discuss different types of air locks used on dryer and cooler cyclones.
2. What is the possibility of drying at a lower temperature and increasing the retention time in a gas-fired dryer?
   What cost advantages would this practice develop relative to fuel and electrical cost per ton?
   How can a furnace be designed to reduce the potential for formation of fumes due to overheating fertilizer granules?
3. Is the use of steam economical in achieving granulation?
   Can comparative cost figures or formulas be given?
   What is needed equipment- and operating-wise to successfully use steam?
   What process factors can cause failure in the use of steam?
4. A panel discussion of the advantages and disadvantages of wet and dry scrubbers with relation to efficiencies, particle size recovery capabilities, maintenance and investment costs.
5. What control data should be collected by plant operators for the efficient operation of a granulation process?
6. A discussion of the economics of instrumentation as related to checking the air flow system through the dryer, furnace, cooler and other duct work systems.
7. What are the important basic principles to consider in the selection of a new granulation plant?
8. Can we save on operating costs and have a good condition material if we screened out only the fines finer than 24 or 28 mesh?
   What is the cost of a given improvement in range of product particle size?
9. A discussion of the advantages and disadvantages of controlling all recycle portions returned to the ammoniator-granulator.
10. Should one use a batch or continuous production system?
    What are the economics of continuous ammoniation compared with batch system ahead of dryer in granulation?
11. Indicate some economic relationships between equipment size, rate of production per hour, annual production capacity and per ton cost of production.
12. What are the advantages of applying suction to the classification screens? Cite actual experiences.
13. What are the principal techniques of ammoniation which contribute to efficiency of operation?
    Since the amount of granulation achieved depends heavily on the ammoniator-granulator equipment, should not more attention be given to Sparger design, location and performance towards this goal rather than for the ease of maintenance, lower initial cost and the replaceability?
14. A discussion of the advantages and disadvantages of screening granulated mixed fertilizer between the dryer and cooler versus screening after the cooler.
15. A discussion of the economics in the selection of high capacity equipment versus low capacity equipment.
16. Discuss economic and qualitative advantages of a Preblender-ammoniator-granulator.
17. A discussion of the effect of re-cycle on raw material costs and factors which influence re-cycle rates.

Economics of Formulation

1. What is the factor that establishes whether a formula is low or high analysis?
2. What is the maximum ammoniation rate using anhydrous ammonia and the several phosphate materials? (phosphoric acid, triple, single)
   What are the specifications, physical and chemical, for triple superphosphate to give good granulation?
3. What is the formula usage, cost and use-availability of:
   diammonium phosphate — triple superphosphate
   super phosphoric acid — calcium metaphosphate
   phosphoric acid
4. A discussion of the operational and quality aspects of the increased use of urea in ammonium nitrate—anhydrous ammonia solutions. Prior to 1957 practically no company making granulated fertilizer used a solution containing a mixture of urea-ammonium nitrate. What have our experiences been with the increased use of solutions such as Sohio's #16, #11, etc., in granulation?
5. Have any facts regarding the characteristics of potash for granulation been developed this year?
6. What are the formula recommendations for good granulation of a 3-2-2 ratio material?
7. A specific discussion of type of conditioners and their relative effect, that is, diatomaceous earth, kaolin and other similar coating agents as related to coating fertilizer granules of normal hygroscopic tendency.
8. Can "spent" sulfuric acid be successfully used in a continuous ammoniator?
9. What are the basic principles and savings in choosing the correct nitrogen solution?
10. What are the cost relationships, tonnage requirements and equipment needs for special mixes including those containing minor element carriers or other additives?
11. Is it possible to eliminate successfully objectionable fumes from the continuous ammoniator's exhausts?
    Are there any known methods of eliminating ammonium chloride, ammonium nitrate and ammonium sulfate aerosols from the exhaust fumes?
12. Is there experimental information available where phosphoric acid is sprayed on top of bed?
    What are the results on distribution and cleanup versus phosphoric acid sprayed under the bed?
13. How can a no or low nitrogen grade be formulated to produce a high quality, granular product economically?
14. Can selection of raw materials help control process fumes and dust?
15. What are the properties of dry ingredients which affect significantly the efficiency of mixing or granulation?
16. A discussion of the economics of phosphoric acid in fertilizer formulations.

National Agricultural Chemicals Assn.

— discusses expanding markets

— public relations programs

— product liability claims

at 25th Anniversary Meeting

THE 25th anniversary annual meeting of the National Agricultural Chemicals Association was held, October 29-31, at the General Oglethorpe Hotel, Savannah, Ga., the first time in many years that the association has departed from the usual site for its annual meeting at Spring Lake, N. J. A large attendance taxed the facilities of the Oglethorpe, and some of those attending were accommodated in hotels in downtown Savannah.

Many of the talks dealt with the 25th anniversary theme, the importance of continued research to develop new, more effective and more specific insecticides, the need to expand industry markets, to educate the buying public as to what insecticides are and how they should be most effectively used, and to favorably influence public opinion as to the importance of the industry and its essential products.

In his opening address as president of the association, J. V. Vernon, whose industry position is that of vice-president of Food Machinery & Chemical Corp., called attention to the big expansion in the volume of business done in the field of agricultural pesticides over the past twenty-five years. In 1933 farmers spent only $29 million for pesticides, while today's comparable total is approximately nine times that figure,—or $260 million. And this impressive figure, he added, is still exclusive of the sum spent on pesticides for application to buildings and to livestock, as well as the cost of application of the agricultural pesticide purchases.

Mr. Vernon observed that the industry is currently investing in the neighborhood of $20 million dollars annually for research and development programs on new pesticides. Added to this impressive figure is the $5 million spent annually on research by the U.S.D.A and the $4 million spent on research projects by the land grant colleges. "Research must be maintained, and pushed more vigorously," Mr. Vernon counseled. "To falter here is to invite industry stagnation and its unprofitable consequences."

Discussing specific problems of the agricultural chemicals industry, the NAC president singled out the following: we are a low profit business; our inventory problem is a peculiarly complex one; the industry's accounts receivable situation presents another big and perplexing problem; and finally, the investment necessary in research and development is tremendous, and is growing with each year.

Nevertheless, in spite of these problems, Mr. Vernon still predicted a growing market for pesticides and an enlarged future for the industry. He suggested that by 1957 the market for the industry's products will reach a billion dollars. Population expansion in the face of a shrinking area of land available for farm purposes will inevitably make farmers use more and more of the pesticidal aids to production. The growth of the larger farm unit is another factor which will tend to expand sale of pesticides. "The larger operators, unlike many small farmers, are unwilling to rely on providence to protect their crops from the bugs and the blights. *They know they can't afford not to use pesticides.*"

Looking to the future, Mr. Vernon suggested that "demand will increase for more products of greater specificity, for the product that will do the 'special' job and do it well." The industry must anticipate this trend and develop such products. It must also, in Mr. Vernon's opinion, be prepared to make changes in established methods of distribution. In the field of customer service, pesticide manufacturers must improve on today's methods. Knowledge developed in the effective application of new and existing products must flow more freely and quickly to the customer. And finally, the speaker warned, the industry must intensify its long-standing efforts to promote safety in the use of pesticides. While the past record in this regard has been a good one, it can and should be improved upon in the future.

Importance of Public Relations

Charles S. Maddock, general counsel for Hercules Powder Co., Wilmington, addressed the group on "The Lawyer's Interest in His Client's Public Relations," emphasizing that in practically every legal situation that might confront a corporation one of the most valuable assets it can have in facing the public or going into court is a good reputation and the confidence and sympathy of the community in which it operates. "History shows," he reminded, "that public opinion plays a major role in the determination of legislative restrictions that are placed upon industry. Although it takes time for the influence of public opinion to be brought to bear to a point where legislative controls are made effective, it is as true as that night follows the day that if the public decides that an industry is acting adversely to the interests of the public, sooner or later the activity to which objection is taken will be curtailed by legislation. In addition, history shows us that the leg-

islation which is ultimately passed usually goes well beyond the restrictions necessary to foreclose the particular conduct to which objection is taken. There seems to be a feeling that if we have a bad actor we had better make sure that we make it impossible for him to continue his non-social conduct, not only in this area but in all areas in any way related to it."

He added that it is not sufficient for an industry association alone to do an effective job of public relations. "This is no substitute for action by individual members of the industry. It is essential that each individual company in the agricultural chemical industry have a consciousness of the importance of good public relations and carry out its own well-planned, carefully implemented program so that the public will know that the industry of which it is a part is vitally concerned with the public interest. For in matters affecting the industry as a whole, the industry will be no stronger than its weakest member.

"This is not an area where companies can relax because they assume that the public knows the truth. It is an area where positive action directed toward the establishment of good public relations based on the truth of the contributions of this industry is essential. Unless positive action is taken to tell the public what this industry has accomplished in the public interest, the battle will be lost by default to the very vocal group of organic gardeners, cancer-conscious quacks in the medical profession, and the other misguided souls who seem intent upon forcing down the public's throat a distorted and basically inaccurate idea of the agricultural chemicals industry's position in the American scene."

Personal Service Paramount

Faith in the future of agriculture, continuing generous investments in research to produce more effective pesticidal products, backed up by a hard-hitting program of personal sales effort were described by Frank S. Washburn, general manager of American Cyanamid Company's Agricultural Division, as his program for a continued steady growth in the agricultural insecticide business over the next twenty-five years.

While he acknowledged that the past twenty-five years have seen the successful application of mass marketing techniques, and of mass promotion media to the successful sale of general consumer items, he nevertheless expressed the opinion that these techniques cannot be expected to provide the answer to the continued growth of an industry whose foundation has always consisted of personal service to, and relationship with, customers. He warned that an overemphasis on the mass marketing approach often leads to neglect of the product services which, when adequately performed, result in customer satisfaction and growth of good will.

James L. Lawler, Shell Chemical Corp., N. Y., general committee chairman, introduces president of NACA, Jackson V. Vernon, who is vice-president of Food Machinery and Chemical Corp., New York. Mr. Vernon was re-elected to a second term as president.

NAC Officers

Jackson V. Vernon, vice-president, Food Machinery and Chemical Corp., New York and Charles H. Sommer, vice-president, Monsanto Chemical Co., St. Louis, Mo., were re-elected president and vice-president, respectively, of NAC. Also re-elected for another year was Lea S. Hitchner, executive secretary and treasurer.

Four new members were elected to the board of directors: Evan T. Collinsworth, Jr., president, Velsicol Chemical Corp., Chicago; William R. Dixon, Dow Chemical Co., Midland, Mich.; Frank M. Feffer, Sr., president, Arizona Fertilizers, Inc., Phoenix; and Robert S. Thompson, president, Thompson-Hayward Chemical Co., Kansas City, Mo.

A record attendance of more than 600 members and guests registered at the meeting in Savannah, Ga. The 1959 annual meeting will be held in French Lick, Indiana.

A group of early arrivals at the anniversary meeting were: former NAC president, "Grub" Leonard; John Rodda, Fairfield Chemicals; Fred Hatch, another former president of NAC, now a consultant; and Edward Phillips, Grange League Federation.

Making his forecast for the next twenty five year period, he predicted that "Good salesmen, who know their business, and know how to give real service, will be in as much demand as they are today.

"A *special price* will never provide a satisfactory, long-term substitute for quality, service and salesmanship.

"No one will have discovered a way to substitute direct mail for man power.

"People will still be hoping that they can get something for nothing, but nobody will seriously expect it."

Read the Label

Dr. Cynthia Wescott discussed "Pesticides and the Public" from a woman's viewpoint. In the light of her experience in answering thousands of questions from all over the country relating to pests and pesticides, the "plant doctor," as Dr. Wescott is known, observed that in all probability "more problems come from chemicals being used incorrectly than from plants being neglected." She added that almost never has one of her questioners read the label on his product closely enough to be able to identify the ingredients, and seldom can he even remember the trade name. Recently, Dr. Westcott recounted, she received nine samples from a rose grower in Alabama. One specimen was a virus disease, one represented normal old age, and the rest involved spray injury.

As a woman gardener she offered the following suggestions to manufacturers of home garden pesticides:

"1. Don't give us toys. We know the men love gadgets but we are practical. We don't want to spend $1.75 for 8 ounces of dust in a squeeze-duster that won't work after a week or so in our dampness. Give us a combination deal of 5 pounds of dust with a good metal duster and make sure we can get more of the same dust, if we like it, when we go back to the dealer.

"2. Tell us, in your advertisements, what chemicals are in your miracle combination sprays and find some way to let us know where we can purchase the combination that best fits our personal requirements. People continually ask me where to buy advertised products and I don't know. I telephone the manufacturer and he doesn't know either; he sells through a distributor.

"3. Don't make us purchase a combination with ingredients we don't need to get one ingredient we want. Make Aramite, Karathane and similar selective chemicals available separately in small packages.

"4. Please remember to give us dosages in tablespoons per gallon as well as pounds per 100 gallons.

"5. We believe that it is just as important to keep our home plantings ornamental as it is to combat the pests. Please persuade tree experts that it is awfully bad public relations to take a swipe at our roses and other flowers while they are spraying the trees. Far too many of my clients have had their roses plastered with an irremovable white coating the day before they were to be entered in a show or used in a promised arrangement for the hospital. Far too many clients have had foliage burned with emulsions never intended for anything but trees. This policy of extra generosity has lost many a tree man a customer and makes the gardener regard all chemicals with a jaundiced eye."

"Soil Fumigation" was the topic of Dr. Herbert L. Haller, assistant to the administrator, Agricultural Research Service, U.S.D.A. Dr. Haller's address appears in full elsewhere in this issue (See pg. 33).

Forest Pesticide Market

J. W. Johnson, superintendent of the Woodlands Research Department of Union Bag-Camp Paper Corp., Savannah, discussed "Forest Pests" and reviewed recent developments in the new and expanding market for forest pesticides. Forest pests are normally classed into four broad types,—insects, fungi, animals and plants. Insect attacks can be devastating and spectacular. An infestation of the Engelman Spruce Beetle swept the Rocky Mountain area between 1942 and 1948, destroying 4 billion board feet of timber. The IPS or Pine Engraver Beetle is estimated to have destroyed 119 million board feet and 190,000 cords of Southern Yellow Pine in 1955 alone in the southeast.

Worst recent example of destructiveness of fungi was the epidemic of chestnut blight which completely destroyed the American Chestnut, a valuable, fast-growing timber species, following introduction of the blight into the United States in 1903. Such diseases as Southern Pine Cone Rust destroy every year a substantial portion of the southern cone and seed crop, and the various heart rots cause losses estimated annually at 1½ billion board feet of sawtimber.

Plants, the speaker reminded, can in themselves constitute pests, though not commonly thought of as such. "Any plant is a pest when it occupies a site on which it can exist but not develop to merchantable size or quality or condition. Or to put it another way, any plant can be a pest on a particular site if it interferes with the establishment or development of a more valuable or desirable plant that is better suited to that site. A prime example is the hardwood brush that has taken over so many pine sites of the South. Little or none of this brush can ever develop into merchantable trees, and unless it is eliminated or controlled, the land will never produce pine again."

Chemical treatments with silvicides are combined with careful cutting practices, controlled burning, bull-dozing, etc., to prevent capture of forest sites by plant pests and to recover sites already lost to these interlopers. Foresters are constantly seeking a better combination of treatments, the speaker asserted, in the interest of efficiency and economy, and look to the agricultural chemical industry for

newer, more effective and economical products. "Here alone is the chance for a potential big expansion of the forest pesticide market."

Reviewing the forester's general attitude toward use of pesticides, Mr. Johnson stated that foresters in general wish they didn't have to use pesticides. "They make for administrative complexity and higher forest management costs," he observed. "We would prefer to let the natural law of biological balance take care of our pest problems, but we are realists and we know that this is just a rosy dream. "With nature, as with all mistresses, we must *manage*, or we shall assuredly be *managed*. To this end, forest managers will continue to use pesticides, and in greater and greater quantities as their investment increases in value and in need of protection. The only limitations will be those of cost and biological safety. Pesticides won't be used if their cost is greater than the values gained; nor will they be employed at the risk of long-term damage to the land complex.

"The degree of expansion of the forest pesticide market hinges on a great deal of additional research both by you in the chemicals industry and by us foresters. First, we who use your products must know a lot more than we do at present about the exact results of that use. Will a particular pesticide effectively control a particular pest under the particular conditions that exist? Second, we are in acute need of more selective pesticides—pesticides that aren't so general in their effects. For example, 2,4,5-T is one of our favorite brush killers, but we wish it weren't quite so indiscriminate in its lethal action. We need a formulation that is certain death to certain plants, and completely innocuous to others. Third, we must still work out the optimum use techniques for the pesticides that are presently available, for a tool is valuable only if you know how to use it. Fourth, there must be a continuing development of new pesticides as new or more resistant pests come on the scene. Suppose something like the chestnut blight pops up in our slash pine plantations here in the Southeast. Heavens forbid! We all would have to do something—fast. Finally, all of us need to keep on the look-out for new and better concepts of pest control and pesticide use. Might there not be a way, for example, of introducing a systemic into slash pine seedlings that would effectively protect them from the pales weevil, or *Cronartium* fungus, or even the *Ips* beetle?"

Pesticides for Roadways

Wilbur J. Garmhausen, chief landscape architect, Ohio Department of Highways, reviewed the "Use of Pesticides Along Ohio's Roadsides." Efficient use of chemicals, he reported, is helping to lower costs in maintaining highway rights of way in Ohio. Spraying has proved to be an effective supplement to mowing and has helped lower control costs. With a greater emphasis on spraying and reduction in expenditure for mowing, the combined cost of spraying and mowing was reduced to $80.04 per mile in 1957, as compared with $108.17 in 1953.

Ohio has approximately 16,000 miles of rural state highways, he reported, or perhaps 55,000 roadside acres. The interstate highway system adds 1500 miles of super highways, with about 35 to 40 thousand acres added to the total here. Chemical control of turf areas has increased over recent years and now 12,000 of the existing 16,000 rural miles are sprayed each season. A three year program of three sprays a year is carried out, followed by spot spraying where necessary.

The Highway Department, the speaker indicated, is always willing to try a new chemical on an experimental basis and encourages manufacturers to present such materials for preliminary study. An annual activity is the Ohio Short Course on Roadside Development which attracts attendance from all over the country. As to new developments which look promising, the

(*Continued on Page* 107)

AS WE GO TO PRESS

Parathion Prices Dropped

October 30, Monsanto Chemical Co., St. Louis, announced sharp price reductions on ethyl and methyl parathion. Both are now priced at 84¢ per lb. Previously ethyl parathion was quoted at $1.36 per lb. and methyl parathion at $1.12 per lb.

James W. Starrett, manager of agricultural chemicals sales for Monsanto's organic chemicals division, said that the drastic price cuts were made to broaden the market and increase volume of use of the two pesticides.

Prices Higher on DDT Bid

In a recent bid opening by the General Services Administration, prices entered by eleven producers of DDT ranged from 25.46¢ per lb. to 27¢. The opening covered 37,000,000 lbs. of 75% wettable powder, with delivery dates spaced each two weeks from November 15 to February 15th. The low bid of 25.46¢ on approximately 7,000,000 lbs. was entered by Montrose Chemical Co., although there was one bid of 22.5¢ by Michigan Chemical Corp. limited to the relatively small quantity of 180,000 lbs. of material not packed to meet specification. Michigan Chemical's DDT plant is not currently operating, having been shut down several months ago.

Michigan's only other bid was on one million pounds for February delivery at the top figure of 27¢.

The general range of prices quoted on this opening was approximately two and a half cents a pound higher than on the most recent previous opening, reflecting the much firmer price situation currently on DDT.

Hanson Leaves United-Heckathorn

Gale Hanson has left his job as supervisor of aerial operations for United Heckathorn, Richmond, Calif. and rejoined the Civil Aeronautics Administration.

SE Fertilizer Group Meets

The third Southeastern Fertilizer Conference was held in Atlanta Oct. 29 and 30. Dr. Russell Coleman, executive vice president, N.P.F.I., spoke at the meeting and said that while most of the soils of the south are classed as acid and infertile, they can be made fertile throught the judicious application of lime and commercial fertilizers.

He said that soil fertility is of paramount importance. Dr. Coleman mentioned the soil testing programs that are being carried out in several southeastern states with considerable success. These programs, he said, do much to put southeastern agriculture in a position that is competitive with the agriculture of other areas. He added that the N.P.F.I. plans to continue to support these programs.

In a report of soil testing in Hoke County, N. C., it was revealed that the program resulted in a 14.7% increase in fertilizer sales, whereas sales for the whole state were down 4 per cent.

Pesticide Industry Problems Highlight Discussions at WACA

THE old Wall-street saying, "Never Buck a Trend,"—was emphasized in a review of technologic and economic trends in agriculture by George R. Ferguson, Geigy Agricultural Chemicals, Ardsley, N. Y., when he addressed over 250 members and guests attending the 29th annual meeting of the Western Agricultural Chemicals Association, October 14-15, at the Villa Hotel, San Mateo, California. "Many of the difficulties of our industry," said Mr. Ferguson, "have resulted from continued efforts to 'Buck the Trend' . . . the economic trends in agriculture are inexorable in their direction and speed,—we cannot stop them or change them. Our job is to recognize them and take advantage of them."

The outstanding trend, said Mr. Ferguson is specialization,—both geographically and on individual farms. Important products such as wheat, apples, poultry, etc., are produced to a considerable extent on one-crop farms.

The other major trend is toward greater and greater competition among agricultural producers, and among major producing areas. The low cost producer survives; the high cost producer sells out to his neighbor and moves to town. Farmers are, therefore, cost conscious and look at their operations in terms of unit cost, versus unit selling price.

Mr. Ferguson outlined the nature of the farm market, the trend, and specific effects on the agricultural chemicals industry. He pointed out that the bulk of the market is composed of less than a half a million individuals from the standpoint of purchasing and decision making,—and that this number will quite possibly decrease. "The economic forces in agriculture are dominant in our business, whether we wish to admit it or not. The farmer in the top 10% bracket is in an extremely good purchasing position,—and in many cases, the credit risk is better with him than with his dealer. When the number of suppliers is greater than the number of distribution outlets," continued Mr. Ferguson, "then we find farmer-dealers and direct selling at wholesale prices to large farmers."

Continuing the discussion of industry problems was a paper by Melvin Goldberg, Pesticide Advisory Service, New York, "The Outlook for Agricultural Chemicals," read in his absence by Ivor Burden. (His full comments appears on pages 23-25, of this issue.)

The position of agricultural chemicals in the world market was reviewed by E. T. Collinsworth, Jr., president of Velsicol Chemical Corp., Chicago. He outlined the steadily increasing threat of Russian production, with statistics illustrating this expansion. As a result of several 5-year plans, he said, Russia has increased total fertilizer production 70% from 1940 to 1950, — the biggest increase being achieved in the production of nitrogenous fertilizers, which increased 97%. Since 1950, new plants have been built in the Ukraine, Asia and the Baltic states, and improvements in processes have resulted in improved quality. Domestic requirements are still not being satisfied in Russia,—but further increases in production are planned for coming years.

Mr. Collinsworth reviewed the five Russian 5-year plans, dating back to 1928, in production of pesticides, reporting to his audience that the current plan calls for a 100% increase in production of DDT, BHC, ethyl mercuric chloride, and beginning production of organic phosphoric compounds.

"Where do we go from here?" asked Mr. Collinsworth,"—"We can conclude that our enemy is rapidly approaching our offensive capacity." We have it on excellent authority that Russia, during this season presented a middle-eastern country with 11 spray planes and 49 pilots,—all free of charge as a token of Russian interest in their welfare . . . and combined with this a donation, 350 tons of 2.5 gamma BHC.

Mr. Collinsworth suggested that the leaders of our pesticide industry, and the pharmaceutical industry, mutually prepare a plan through the respective associations for a humanitarian offensive on the underdeveloped countries of the world,—to be spurred through a tax incentive arrangement to encourage the export not only of our products, but also know-how and capital.

By way of technical discussions, WACA members heard Dr. Irvin M. Hall, Citrus Experiment Station, Univ. of California, report on "Microbial Control of Insects." The commercial use of living insecticides has already started with the advent of *Bacillus Thuringiensis Berliner*, said Dr. Hall; however, microbial control is at the same stage of development as the first industrially produced chemical insecticide that entered the market a great many years ago. It should not be oversold, he cautioned.

Microbial insecticides are quick-acting, easy to produce, keep well, do not lose their virulence with repeated growth on artificial media . . . but they should not be oversold, he cautioned.

During the business sessions, WACA members re-elected as president Ivor Burden, United Heckathorn Co.; elected Jack White of White Chemical Co. as vice president; and re-elected as secretary-treasurer, Charles Barnard.

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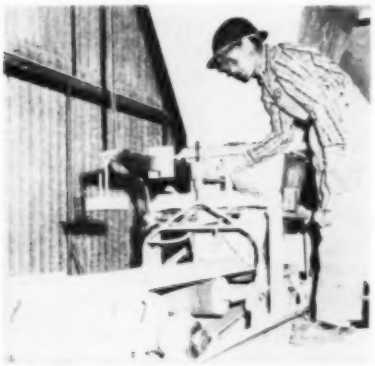
WACA To Meet March 17

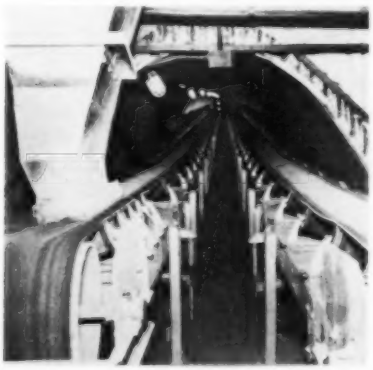
A special session of the Western Agricultural Chemicals Association will be held March 17, 1959 at the Hotel Miramar, Santa Barbara, Calif. Technical representatives of industry will participate in a panel discussion of new pesticides. A. Boyce, University of California, will moderate.

ONTARIO'S NEW GRANULAR PLANT

The cyclones for dust collecting are shown in this view of all three floors of the plant.



A constant weight machine feeds a steady amount of pre-mix into the granulating equipment.



Raw materials come into plant on belt at right and leave in granular form on belt at left.

Exterior view of the plant shows canopy housing raw materials and finished goods conveyor belts.

SEVERAL hundred farmers in southwestern Ontario recently attended a three-day "open house" at the new granular fertilizer plant of Canadian Industries Ltd. at Chatham, Ontario. The event marked the official opening of the most modern plant in eastern Canada designed to produce completely granulated fertilizer.

The plant and equipment were designed by C-I-L's engineering department in co-operation with A. J. Sackett & Sons Co., Baltimore, Md.

The basic ingredients for the fertilizer come into the plant from an adjoining mixing building on a conveyor belt in the proportions required for the formulation being made.

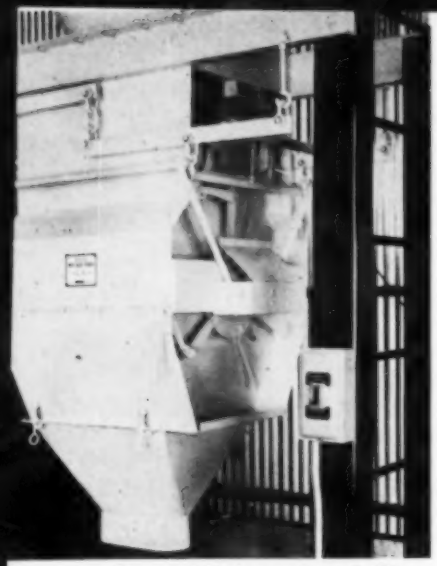
Raw materials are carried to a constant weight feeder which feeds a steady, predetermined amount of dry pre-mix into the granulating equipment, the first vessel of which is the ammoniator. In the rotary ammoniator, sulfuric acid, nitrogen solution, or anhydrous ammonia are added according to specifications. Flow of these liquids is regulated automatically by control valves at a preset rate.

The fertilizer discharged from the ammoniator is carried by chute to a Sackett Star Granulator where it is subject to a further rolling action to produce round, uniform granules. The granules move to the dryer on the ground floor, and are then carried by an elevator to a cooler and finally to the top floor of the plant where they are passed through air-swept, double deck screens.

Correct sized granules roll down the screens and fall through a chute to the second floor; thence onto a conveyor belt which takes them to storage in the adjoining building. Smaller particles fall through the second screen and are recycled through the granulating system. Particles larger than ¼ inch in diameter are caught on the top screen and recycled.

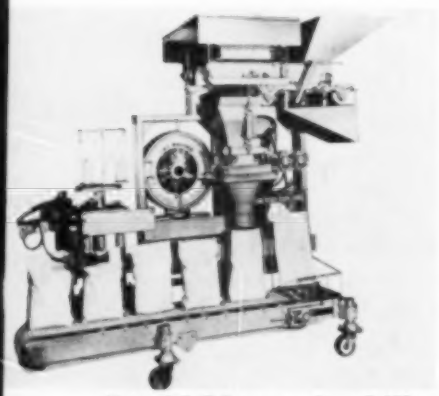
The plant is equipped with an elaborate dust reclamation system. Dust created by the movement of fertilizer in the dryer and cooler is drawn through large cyclones and recycled. Fumes are drawn through a Venturi Scrubber to prevent air pollution.

All steelwork in the plant has been protected with a special asphalt chromate emulsion paint. All process flow control equipment and electrical control equipment are housed in separate, air-conditioned control rooms. A feature of the electrical installation is the use of poly-vinyl coated conduit throughout the building.★★



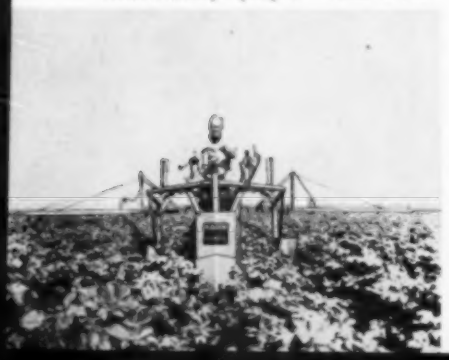
Raymond Packer — Item A-101

YaleTractor Shovel — Item C-307



Union I & C Bagger — Item A-103

Hahn Hi Boy Sprayer — Item G-710



Developments and Improvements in

EQUIPMENT

WEIGHING AND BAGGING EQUIPMENT

Raymond Rotomatic Packer

Raymond Bag Corp., Middletown, Ohio, has introduced this year a fully-automatic, all mechanical openmouth packer, requiring no outside source of power. The weight of material being weighed operates the Raymond Rotomatic Packer by gravity flow. (The unit is described fully in the July, 1958 issue of *Agricultural Chemicals*, page 86).

A rotary hopper suspended by scales is located beneath the valve. When the hopper is filled to a pre-specified weight, the valve is closed. Under ideal conditions, the Rotomatic Packer, using dense material, is capable of cycling at the rate of 45-100 pound units per minute, and accurate weights are unaffected by the speed of operation. The machine will pack standard 50 to 100-pound multiwalls with equal ease.

See advertisement page 15

Circle A-101 on inquiry card page 51

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Bemis Rapid-Weigh Bagger

A new bagger which accurately weighs and fills 25- to 200-lb. capacity bags with granular, pelleted or meal type fertilizers at speeds up to 24 bags per minute and within an average weight accuracy of two ounces has been developed by the Bemis Bro. Bag Company, St. Louis, Mo.

A controlled cycling system permits faster operating speeds and eliminates spillage. All functional parts and those in contact with the product are made of stainless steel. A corrosion resistant paint is used throughout the bagger.

The Rapid-Weigh features the Bemis Taper-Grip bag holder which minimizes deforming of bag tops to permit easier sewing, properly fills out bag bottoms and holds each bag securely to enable the operator to prepare the next bag for the feeding operation.

Circle A-102 on inquiry card page 51

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Union's I & C Bagger

A new series of baggers for fertilizer and feed packaging has been offered in recent months by Union Bag-Camp Paper Corp., New York, featuring completely automatic operation, speed, and accuracy. I & C series 200, Models UB-201 and UB-200 are equipped with gates which allow gross weighing *and* net weighing. The operator can change over from one operation to the other in seconds, simply by flipping a "net-weigh" selector switch and installing a spout mounting and spout which clamps on to the machine.

The new machines net-weigh 10 lb. through 50 lb. bags of granular fertilizer material and 10 lb. through 25 lb. granular feed material. As gross weigh machines they handle 80 lb. through 200 lb. granular fertilizer material and 25 lb. through 100 lb. feed material.

Two mounting positions for the sewing head adjust for either one man operation or two-man operation. Models 200 and 201 require 3½′ x 5′ of floor space and 7′ above the sewing head conveyor. They are equipped with wheels to

for the Agricultural Chemicals Manufacturer and Applicator

be moved into alignment with other equipment.

For net-weighing up to 200 pounds, Union Bag offers its "100 series" I & C bagger.

See advertisement pages 10, 11

Circle A-103 on inquiry card page 51

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The Southland Packer

An electric packer for open-mouth multiwall and textile bags is offered by the Chase Bag Co., Chicago, as the Southland Packer. The unit is made from 12 gauge or heavier steel plate; the feeder is of the continuous operating type, using a ½ h.p. gear-enclosed motor to operate its endless belt. Parts are standardized and can be interchanged.

The Southland Packer handles up to 30 50-lb. bags per minute; up to 25 80's and 100's. The unit also features a one-scale system, with fewer moving parts and weight points, and a spring suspended bag-filling spout for less spillage and dusting.

Circle A-104 on inquiry card page 51

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Inventory Bag Scale

A new totalizing inventory bag scale that recalibrates linearly has been developed by Thayer Scale Corp., Pembroke, Mass. The scales are available with capacities of 100 pounds to 300 tons per hour. The scale and rollers support level or inclined conveyor systems and the endless belt is not altered or interrupted. A totalizer can be located remotely, or can be read directly at the scale.

See advertisement page 106

Circle A-105 on inquiry card page 51

Kraft Open-Mouth Packer

The Kraftpacker, an automatic open mouth filling machine handles any free flowing material in the 25-200 range; it is however, designed particularly for use in fertilizer plants. Kraft Bag Corp., New York is the sales agent for this equipment.

The packer can operate at high speeds, and will drop up to 30 charges per minute. A continually moving feed conveyor, and a surge hopper cut-off assures accuracy to plus or minus four ounces.

See advertisement page 73

Circle A-106 on inquiry card page 51

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New Bagcloser by Bagpak

Bagpak Division, International Paper Co., New York, announced this year a new bagcloser, Model 171, complete with 9'9" self-leveling conveyor, automatic stitcher head, welded steel construction, ball and roller bearings. The new model handles bags 14½" to 30" high, and is suggested for fertilizers, feed etc. and consumer units in SOM paper bags. It is said to be simple and fast, allowing two men to handle 20 bags a minute. The standard model is wire to Nema 4 specs; furnished to Nema 7 or 9 specs at ⅓ optional cost of other machines.

Circle A-107 on inquiry card page 51

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Richardson Gross Bagging Scale

A gross bagging scale, with feeder, featuring an eye-level visual balance indicator was announced early this year by the Richardson Scale Co., Clifton, N.J. The indicator operates on the torsion principle so that indication is rapid, accurate and stable.

The new unit, designated GA-17 Gross Bagging Scale, was developed to meet the need of small plants for an inexpensive, one-man bagging unit. With this scale, bagging of non-free flowing materials is done at both low initial and low operating costs. It is available in stainless steel.

Designed for use with open mouth textile and multi-wall paper bags, the GA-17 provides accurate filling of 10 to 140-lb. bags. The weigh beam indicator-pointer is marked off in easy-to-read numerals and informs the operator at a glance the accurate balance of the weigh beam. The scale requires minimum head-room.

See advertisment page 110

Circle A-108 on inquiry card page 51

•

Fry Bag Closing Machine

George H. Fry Co., Mineola, New York, offer a bag-closing machine for automatic, square or flat paper bags, used in filling insecticides, fertilizers, chemicals, milk powders, and other granular products. Model CSG is semi-automatic, sift-proof because it double-folds, heat seals and glues on heavyweight, coated or lined paper bags.

See advertisement page 113

Circle A-109 on inquiry card page 51

•

Tape-Over-Seam Bag Closure

Union Special Machine Co., Chicago, has developed a method of closing tops of multiwall bags with a "tape-over-seam" closure. The closure is produced by the company's machine 80600 HZ, which has been designed for automatically applying pressure-sensitive, self-adhering tape in conjunction with the sewed closure.

This type closure is of particular use in bagging very fine and dusty materials, where it is important to avoid contamination of the bagged product.

Circle A-110 on inquiry card page 51

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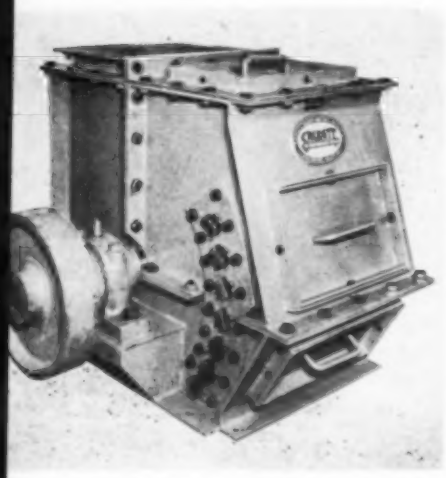
Portable Bag Closer

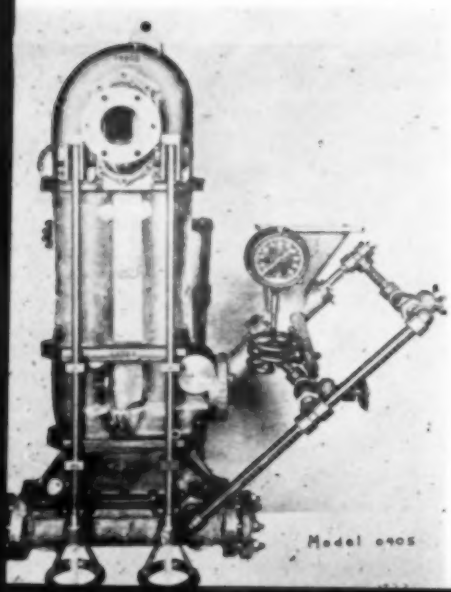
A portable traveling head unit for closing bags while they are on a platform scale has been

Raymond Vertical Mill — Item B-201



New Sackett Crushing Mill—Item B-205

Fluid Jet-O-Mizer — Item B-204



introduced by the Minneapolis Sewing Machine Co., Minneapolis. One operator can fill, weigh, and sew without moving the bag or changing his position.

Circle A-111 on inquiry card page 51

●

Belt Conveyor Bag Closer

Dave Fischbein Co., Minneapolis,, has introduced a belt conveyor sewing unit, Model B-5. The entire unit operates from one 110-volt outlet, with no special wiring necessary. The machine stitches at the rate of thirty feet per minute.

Circle A-112 on inquiry card page 51

●

Drop Testing Machine

St. Regis Paper Co., New York, has developed an automatic flat drop testing machine, that it is claimed can test filled multiwall bags faster and more accurately than the free-falling rate testers now in general use. The machine tests paper bags for strength and resistance to breakage.

Circle A-113 on inquiry card page 51

GRINDING AND PULVERIZING MILLS

Raymond Insecticide Mills

In the past year, Combustion Engineering, Inc., Raymond Division, Chicago, Ill., has offered the Raymond Vertical Mill in addition to the Raymond Roller Mill and Whizzer-equipped Imp Mill for insecticide grinding. The Vertical Mill is a medium capacity unit suitable for blending 50% or higher concentrates to high finenesses of 90% to 95% minus 325 mesh or finer. Its outstanding features include compactness, instant and complete accessibility, very minimum down time for cleanout, easy and positive fineness control, and automatic dust free operation.

The Raymond Roller Mill, with or without flash drying accessories, provides for the economical large capacity fine grinding of insecticide diluents and other nonmetallics. A report on the use of this mill on phosphate rock is given in advertisement on page 19.

Circle B-201 on inquiry card page 51

●

Sturtevant Micronizer

Sturtevant Mill Co., Boston, Mass., recently introduced the Sturtevant Micronizer which grinds and classifies in one operation in a single chamber, provides fines in range from ½ to 44 microns, handles heat-sensitive materials. Because of the quick passage of the material through the machine in a cool atmosphere, there is no attrition heat. The particles grind each other by violent impact. Fines are classified in a central section of the chamber, then collected for bagging. The mills range in size from 2-inch grinding chambers to 36-inch.

Grinding chambers range from 2-inch diameter laboratory size (½ to 1 lb. per hour capacity) to large 36-inch diameter production size (500 to 4000 lbs. per hour capacity).

See advertisement page 86

Circle B-202 on inquiry card page 51

●

KVS Air Swept Ball Mill

Kennedy-Van Saun, New York, offer the Air Swept Ball Mill with grinding capacities to 75 tons per hour. Use of the Kennedy classifier with the mill makes possible production of a wide range of product sizes.

Circle B-203 on inquiry card page 51

●

Fluid Energy Jet-O-Mizer

The Fluid Energy Processing & Equipment Co., Philadelphia, offers a line of Fluid Energy Jet-O-Mizer Mills designed for continuous grinding of solids, ranging from heat sensitive soft waxes to hard abrasives, down to low micron particle sizes at reasonably large production rates.

Specifically, Fluid Energy Mills deliver micron and sub-micron products of a narrow distribution range, not ordinarily obtainable with other types of grinding equipment. These mills can achieve

many other functions simultaneously with fine grinding, such as dehydration of wet materials, coating of fine particles with other materials, and chemical reactions.

The mill is suggested for grinding insecticides, hard talcs, clays, ceramics, metals, abrasives, pigments, coals, resins, pharmaceuticals and many other chemicals where fineness with narrow particle range is required.

See advertisement page 90

Circle B-204 on inquiry card page 51

●

Bradley Pneumatic Mills

A mill producing uniform grind from 20 to 325 mesh is offered by Bradley Pulverizer Co., Allentown, Pa., as the Bradley Pneumatic Hercules Mill. The unit is recommended for fine grinding of limestone, phosphate rock, etc. Automatic electrical feed control eliminates manual operation.

See advertisement page 74D

Circle B-205 on inquiry card page 51

●

I & C Pulverizer

Inglett & Co., Augusta, Ga., recently added a rotary pulverizer to its line of equipment for the fertilizer industry. The pulverizer is available in chain flail and sling bar types.

Circle B-206 on inquiry card page 51

●

New Sackett Crusher

A. J. Sackett & Sons Co., Baltimore, have just announced a new mill, No. 15 CB Mill. It is designed for reducing very hard oversize material from the screen when producing granular fertilizers. Maximum reclamation of the product, with a relatively small portion of fines is reported for the new mill. U. S. and foreign patents are pending.

See advertisement page 53

Circle B-207 on inquiry card page 51

●

Sulphur Grinding Mill

The Raymond roller mill with whizzer is specially equipped for sulphur grinding. Made by the Raymond Division of Combustion Engineering, Inc., Chicago, the mill may also be used for handling concentrate formulations.

Circle B-208 on inquiry card page 51

Munson Attrition Mills

A new line of ball-bearing attrition mills is being offered by Munson Mill Machinery Co., Utica, N. Y. The main use of these mills is in the reduction of grains and grinding of such industrial materials as fertilizers. The product can be ground fine enough to pass through a 250-mesh screen. The capacity varies according to the nature of the stock, and fineness of grinding desired.

Circle B-209 on inquiry card page 51

New Gruendler Hammermills

The Gruendler Crusher and Pulverizer Co., St. Louis, Mo., offers a new series of hammermills. The units are of welded steel frame construction and are made with non-choking rotors in two diameters, 24 and 30 inches, and twelve widths. The mills give a large ratio of reduction, and may be furnished for primary or secondary crushing. Gruendler also offers ribbon, paddle, and tumble mixers.

Circle B-210 on inquiry card page 51

CONVEYORS • TRUCKS • FEEDERS

Omega Belt Weigher

The Omega Machine Co., division of BIF Industries, Inc., Providence, R. I., offers a new belt weigher that is said to meet the need of continuous process industries for measurement and control of flow of dry materials at low to medium rates up to 3000 pounds per minute.

Known as Pneu-Weigh, the unit operates over a 10:1 range, and can be converted to 50:1 by the Omega variable speed belt drive.

Circle C-301 on inquiry card page 51

●

Clark Lift Trucks

A new line of electric powered fork trucks was announced earlier this year by the Industrial Truck Division of Clark Equipment Co., Battle Creek, Mich. A major performance advantage claimed for the new machines stems from the use of a new type of carbon pile drive control, which is said to provide constantly smooth acceleration from a standstill to full maximum speed,—and permit full control of "inching" during delicate stacking operations.

Certain gas-powered fork trucks offered by Clark Equipment have been modernized this year, with special construction featuring extra safety. The equipment is particularly suited for handling flammable materials.

Circle C-302 on inquiry card page 51

○

Explosion Proof Lift Truck

The Revolvator Co., North Bergen, N. J., has developed an explosion proof fork lift truck designed for use in plants where dust and fumes create explosion hazards. The unit is equipped with threaded joints. The truck is called the 54.00 Go-Getter.

Circle C-303 on inquiry card page 51

●

Tractor-Shovel

Frank G. Hough Co., Libertyville, Ill., recently announced a new four-wheel drive tractor shovel with 7000 lb. carrying capacity. The model H-70 will replace the model HH Payloader. New features of the H-70 include more traction, greater protection against dirt and dust, and a more efficient torque-converter. Gasoline and diesel engines provide from 105 to 110 hp.

Circle C-304 on inquiry card page 51

●

Plastic Fertilizer Spout

The Plastic and Latex Division of Minnesota Rubber Co., Minneapolis, has developed a new spout for fertilizer attachments on grain drills.

Spouts are made of rigid polyvinyl chloride plastic material.

Circle C-305 on inquiry card page 51

●

Case Wheel-Type Loader

A new wheel-type loader, with power boosting torque converter drive has been offered this year by the J. I. Case Co., Racine, Wisc. Standard equipment includes a self-leveling bucket, shuttle transmission, and power steering. Des-

ignated the Case 420, the loader is said to offer extra push-power at low working speeds. The torque converter on this model serves to increase traction, since the operator can "nudge" the bucket into the stockpile smoothly, and apply extra power steadily, without spinning wheels or stalling the engine.

Circle C-306 on inquiry card page 51

●

Yale Tractor Shovel

Yale Materials Handling Division, Yale & Towne Manufacturing Co., Philadelphia, this year announced a new industrial tractor shovel with 25% greater work capacity than units available previously. Designed as the Y-18, new features include a 2500 pound carrying capacity , 6-ft. high dumping clearance, automatic torque transmission, rapid acceleration (0 to 8 miles per hour in 3½ seconds) , 45-degree bucket tip-back at ground level. A range of bucket capacities from 10 to 27 feet is available, and variety of attachments is offered for specialized handling requirements.

Circle C-307 on inquiry card page 51

●

Kennedy Air-Float Conveyor

An air-gravity conveyor with tile conveying surface is made by Kennedy Van Saun Manufacturing and Engineering Corp., New York City. The Kennedy Air-Float Conveyor has no moving parts, uses small volumes of low pressure air, and conveyed materials are completely enclosed, eliminating any dust problem. The equipment can be had in corrosion resistant alloys.

Circle C-308 on inquiry card page 51

●

Farquhar Conveyor

Simple bag handling which doubles bag handling capacity is the feature of the Oliver-Farquhar Conveyor, made by A. B. Farquhar Division, York, Pa. Models 439 and 431 make up a conveyor line that runs from the bag stitching area directly into trucks being loaded.

Circle C-309 on inquiry card page 51

●

Electric Powered Trucks

A new line of electric-powered, stand-up, center-control fork trucks, with capacities from 4000 to 10,000 pounds is being offered by the Elwell-Parker Electric Co., Cleveland. All models feature front-wheel drive, and real-wheel steer.

Circle C-310 on inquiry card page 51

●

Syntron Vibratory Feeder

An electromagnetic vibratory feeder designed for high-capacity feeding where installation space is limited, is manufactured by Syntron Company, Homer City, Pa. Models offered vary in feeding capacities from 25 to more than 1000 tons per hour of dry materials weighing about 100 pounds per cubic foot.

Syntron also have designed a new shaker screen, for fast scalping and sizing of heavy bulk materials. A variety of screen surfaces—woven wire cloth, wedge slot, flange lip, or perforated plate—can be fitted into the screen box. The unit will accomplish a number of graduations, depending on the material being handled, and length of vibrating screen.

Circle C-311 on inquiry card page 51

●

Belt and Loading Conveyors

Power-driven horizontal and inclined conveyors for use in handling 25 to 200-pound bags are offered by K. E. Savage Co., Norfolk, Va. Truck loading conveyors are built in lengths to allow maximum flexibility. These conveyors are best suited where tonnages of the same formulation are shipped on the same truck at one time. They do not, however, lend themselves well where more than one formulation is being shipped on a single truck.

Circle C-312 on inquiry card page 51

PRODUCTION AND CONTROL EQUIPMENT

Renneburg Gas-Fired Furnace

Edw. Renneburg & Sons Co., Baltimore, offers a double shell, air cooled combination chamber that is said to eliminate the need for refractories. The front of the furnace is designed to insure even distribution of all of the air entering the combustion chamber so that there will be a uniform flow across the entire cross-section of the furnace as it passes the continuous multi-flame gas burner assembly. Gas-firing equipment includes spark plug ignition and safety and temperature controls.

See advertisement page 100

Circle D-401 on inquiry card page 51

●

Buffalo Fertilizer Meter

Precise volumetric measurement with Niagara electricontact meters is offered liquid fertilizer formulators by Buffalo Meter Co., Buffalo, N. Y. Each nutating cycle of the piston of this meter displaces a fixed volume, which remains constant for any specified liquid and temperature range. The meter may be set to the desired gallonage, and the meter automatically stops the flow when that gallonage has been delivered. Buffalo Meter also offer non-displacement magnetic meters for measurement of slurries and viscous liquids.

See advertisement page 98

Circle D-402 on inquiry card page 51

●

Blue Valley Ammoniator

Blue Valley Equipment Manufacturing and Engineering Co., Topeka, Kansas, manufacture TVA type continuous ammoniators in several sizes. Recent changes include an improved design for sparger arrangement and scraper action. The Blue Valley process permits use of low-cost liquid ingredients such as anhydrous ammonia, nitrogen solution, water, steam, phosphoric or sulfuric acids.

Circle D-403 on inquiry card page 51

●

New 30" Separators

Three new 30" diameter vibrating screen separators in 1, 2 and 3 deck models for the fertilizer and other process industries have been announced by the Southwestern Engineering Company, Los Angeles, California. The new models give an intermediate size between the company's 18" and 48" diameter units.

The units are suggested for

use in screening fertilizers, and in processes involving separation of solids from liquids. Two to four fractions can be obtained by using a 1, 2, or 3-deck separator.

The 30" separator is constructed of carbon steel or type 316 stainless steel and employs a totally enclosed 60 cycle, 3 phase, 1200 RPM, ½ HP, 220/440 V. motor. Explosion proof motors, 50 cycle and 550 V. motors are also available.

Circle D-404 on inquiry card page 51

Calcining Phosphate Rock for Fertilizer

In its first application in the fertilizer industry, Dorr-Oliver, Inc., Stamford, Conn., announces that the Dorrco FluoSolids System will be employed shortly to calcine phosphate rock at new plants in Wyoming and Idaho. In one installation, a two-Reactor System will calcine 1000 tons per day of native phosphate rock. Each reactor is capable of reacting a maximum of 25 tons per hour of a very abrasive and sticky feed material.

The Dorrco Fluo-Solids System employs a fluidized bed principle. Reactors are divided vertically into three compartments by refractory arches. Feed material, about −¼" in size, is first admitted to the top, or preheating chamber, where it is heated by hot gases rising from the calcining chamber beneath. Preheated rock overflows into a 14′ diameter calcining compartment below, and is calcinated at approximately 1450° F. Fully calcined particles overflow into the lower or cooling chamber, where they are cooled by incoming air. Cooled product is taken off for further processing, while the hot gases, after rising counter-currently through the upper compartments, are passed through cyclones to remove fine entrained dust.

Circle D-405 on inquiry card page 51

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Heavy Duty Twin Mixer

The Rapids Machinery Co., Marion, Ohio, has introduced a new heavy duty mixer, with a capacity of up to three tons on either dry or semi-wet materials. A 4-ton capacity model is available for dry mixing. The Marion Twin Mixer has twin arms and blades, and features a 4-way mixing action that tumbles the mix from ends to center and also from side to side.

Circle D-406 on inquiry card page 51

•

Centrifugal Classifier

Buell Engineering Co., New York, this year offered a new centrifugal classifier system for use in classifying fertilizers, fillers, milled products, etc. The system will extract from most feed materials more than 98% of the very fine particles, having diameters smaller than 325 mesh, with no oversize material in the fines.

The classifier is available in sizes to handle from 100 pounds to 100 tons of feed material per hour, and is particularly recommended for classification application in the 400-200 mesh range.

Circle D-407 on inquiry card page 51

•

Hydrator for Dry Chemicals

Joaquin Agricultural & Engineering Co., Hanford, Calif., has developed a new hydrator for the application of dry agricultural chemicals, such as gypsum, lime, sulfur, and fertilizers, through irrigation systems. The hydrator, which contains no moving parts, is available in 1, 2, and 3-ton units for pressure or gravity irrigation.

Circle D-408 on inquiry card page 51

•

Young Dust Blending System

Young Machinery Co., Muncy, Pa., offer a 500-lb portable cutback dust blending system. It has a capacity of 4 to 500 lb. batches per hour, requires an overall space for installation of 6′6" x 10′6" x 15′ OA ht.

The system includes a dust hood at loading station; sifter; premixer at floor level; pneumatic conveyor blender; after-mixer with dust collector; dust hood at packaging station, etc.

See advertisement page 120

Circle D-409 on inquiry card page 51

•

Densifier and De-aerator

J. M. Huber Corp., Borger, Texas, have developed and patented a new method and new equipment for de-aerating and compacting, or densifying, fine powdered materials. The unit makes possible the production of less dusty products with a uniformly higher density, and affords a positive way of reducing packaging materials and transportation costs. Manufacture and use is licensed by Huber to any company interested.

Circle D-410 on inquiry card page 51

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Schaffer Poidometer

Schaffer Poidometer Co., Pittsburgh, offers a self-contained unit which weighs and feeds pulverized, crushed or granular materials for batch or continuous operation. Standard equipment includes motor drive, a recording device that shows the amount of material delivered in any specified time, and an automatic control gate, which stops the poidometer when the material supply in the hopper becomes too low.

Circle D-411 on inquiry card page 51

•

McDermott Bros. Dryer

McDermott Bros. Co., Allentown, Pa., manufactures rotary dryers for drying granulated fertilizer, which are two to three times as large as those in use before the advent of granulation. The dryers are equipped with heavy type trunion wheels. Large thrust rollers prevent longitudinal movement, and keep the shell rotating smoothly. A retaining ring at the feed end prevents back-spill.

Circle D-412 on inquiry card page 51

•

Chemico Scrubbing Units

Chemical Construction Corp., New York, have recently developed a new scrubber, the S-F Venturi, which permits recovery of valuable by-products. An S-F scrubbing system has been designed to remove and recover ammonia, as well as micron sized fertilizer dust from gases leaving process equipment used to produce high analysis ammonium phosphate. Other Chemico processes using Chemico scrubbers are adaptable to a variety of operations for the fertilizer and chemicals industry, — including scrubbing to simply remove pollutants; scrub sub-micron phosphoric

acid from gases leaving hydrators in phosphorus burning plants; solve general air pollution problems. *See advertisement page 88*

Circle D-413 on inquiry card page 51

•

Falcon Blender

For pesticide mixers and formulators, Falcon Manufacturing Division, First Machinery Corp., Brooklyn, N. Y., offer the Falcon Blender. The unit features a double ribbon assembly for fast efficient mixing. Jackets are available for heating or cooling.

See advertisement page 112

Circle D-414 on inquiry card page 51

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Graphic Control Panel

The Barnard & Leas Mfg. Co., Cedar Rapids, Iowa, have added a graphic control panel as standard equipment on the B & L Autobatch and the B & L Autobatch Skid Plant line of liquid fertilizer equipment. The panel provides remote control.

Circle D-415 on inquiry card page 51

•

New Magnetic Flow Meters

Magnetic Flow Meters, manufactured by the Foxboro Company, Foxboro, Mass., for phosphoric acid and nitrogen solution measurements are now offered in two new line sizes—1/10 and 3/16-inch. In another new development, a measuring circuit now available in the receiving instrument reduces to 2.5 feet per second the minimum full scale flow rates obtainable with meters of 1/10-inch to 72-inches.

Circle D-416 on inquiry card page 51

PUMPS • VALVES • TANKS

D-O Hypalon Lined Pumps

Dorr-Oliver, Inc., Stamford, Conn., is offering Hypalon lined Loivite and Oliver diaphram slurry pumps. All presently available sizes of the two pumps are now lined with Hypalon synthetic rubber to provide greater resistance to both abrasion and corrosion. Hypalon (chlorosulphonated polyethylene) is a relatively new synthetic rubber introduced by du Pont some five years ago.

Circle E-501 on inquiry card page 51

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Pumps for Liquid Fertilizers

Pumps for fertilizer and temperature controlled liquids are offered by Dean Hill Pump Co., Indianapolis, Ind. The pump incorporates a steam-jacketed line shaft and discharge column to assure a continuous free flow. Bearings and shaft damping bushings are lubricated by the liquid itself. The pump is suggested for ammonia fertilizer applications.

Circle E-502 on inquiry card page 51

•

Pump for Fumigant Materials

The Tryco Manufacturing Co., Decatur, Ill., is offering a new Model F-100 pump-engine unit designed especially for the rapid application of heavier-than-air grain fumigant materials in flat or round storage buildings. The high volume, vane-type pump delivers up to 19 gallons per minute, and is equipped with special packing that will withstand the action of grain fumigants.

Circle E-503 on inquiry card page 51

•

Iron Pump for Liquid Fertilizers

Marine Products Co., Detroit, has developed an engine-driven pump of all-iron construction that is recommended for the transfer or spraying of liquid fertilizers. The iron construction resists corrosive effects of liquid fertilizers.

Circle E-504 on inquiry card page 51

•

Pressure Relief Valve

Spraying Systems Co., Bellwood, Ill., offers a pressure relief valve made with stainless steel parts for maximum resistance to liquids containing abrasive suspended solids.

Circle E-505 on inquiry card page 51

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Grinnell-Saunders Valves

A valve for handling fertilizer chemicals, including nitric, sulfuric, and phosphoric acids—the ammonium, sodium and potassium salts,—etc., is offered by Grinnell Co., Providence, R. I. A choice of materials for body, body lining, diaphragm, – choice of bonnets,– and choice of bodies permits selection of valve suited to various conditions. One attractive feature of the Grinnell valve is that the valve's bonnet mechanism never comes in direct contact with the fluid stream, thus preventing abrasion and corrosion of those working parts.

Circle E-506 on inquiry card page 51

•

Link Belt Settling Tank

A newly designed settling tank for removal of solids from liquids has been announced by Link Belt Co., Chicago. The Uniflow Tank features a sloping bottom, with multiple effluent weirs.

Circle E-507 on inquiry card page 51

•

Prefabricated Steel Tank

A prefabricated galvanized steel tank that holds more than two hopper bottom rail cars of any free-flowing dry granular material is offered by the Butler Manufacturing Co., Kansas City, Mo. The new tank is 12-feet in diameter, with a center draw-off hopper, and provides up to 80 tons of self-unloading bulk storage for processing plants and distribution depots.

Circle E-508 on inquiry card page 51

•

Reinforced Plastic Tanks

Jones & Hunt, Inc., Gloucester, Mass., is offering fiberglass plastic tanks that are said to have a strength to weight ratio in compression and tension greater than steel. Sizes of the tanks range from 110 to 4,000 gallons. Chemically inert polyester resins are used in construction, reinforced with about 40 per cent woven glass roving and mat.

Circle E-509 on inquiry card page 51

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Cole Aluminum Tanks

Welded aluminum tanks for nitrate solutions for storage or processing of agricultural chemicals are supplied in standard or special designs by R. D. Cole Manufacturing Co., Newnan, Ga. Tanks may be shop built or field erected, using flat, flanged and dished or hemispherical heads.

Circle E-510 on inquiry card page 51

CALCULATORS • INDICATORS • AIDS

Sulfuric Acid Calculator

For the phosphate industry, American Cyanamid Co., New York, offers acidulators a sulfuric acid calculator. On the slide rule principle, the calculator shows pounds of sulfuric acid to be deducted or added at various ratios of free acid and per cent insoluble.

Circle F-601 on inquiry card page 51

•

Chlorate Safety Chart

A large safety wall chart, listing instructions for the proper handling of chlorate and perchlorate chemicals has been prepared by the American Potash & Chemical Corp., Los Angeles. The chart is a digest of safety rules and conduct. A first-aid section contains instructions to follow in case of an accident.

Circle F-602 on inquiry card page 51

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Atlas Cost-U-Lator

Atlas Powder Co., Wilmington, Del., has prepared a handy chart for computing the cost of emulsifier per gallon of concentrate, and the percentage of emulsifier to use to meet a fixed cost of emulsifier per gallon. Costs and percentages are derived by plotting the weights, as listed in the tables at the left, on the scales at the right.

Circle F-603 on inquiry card page 51

Humidity Indicator

Andrew Technical Supply Co., Chicago, has a new humidity indicating device called the "Humigraph." It is a card, sized 2 by 6 inches, with seven indicator spots which change color from blue to pink as the atmospheric humidity changes. The card is scaled to show relative humidity by reference to the color change spots. It reads from 10 to 80 per cent relative humidity, and may be used at temperatures from 40 to 200°F.

Circle F-604 on inquiry card page 51

•

Niagara Filter Area Calculator

A new filter area calculator working on the slide rule principle is offered by Niagara Filters Division, American Machine and Metals, Inc., East Moline, Ill.

Pocket sized, the calculator makes possible rapid determination of square feet of filter area required in liquid-solids separation.

Circle F-605 on inquiry card page 51

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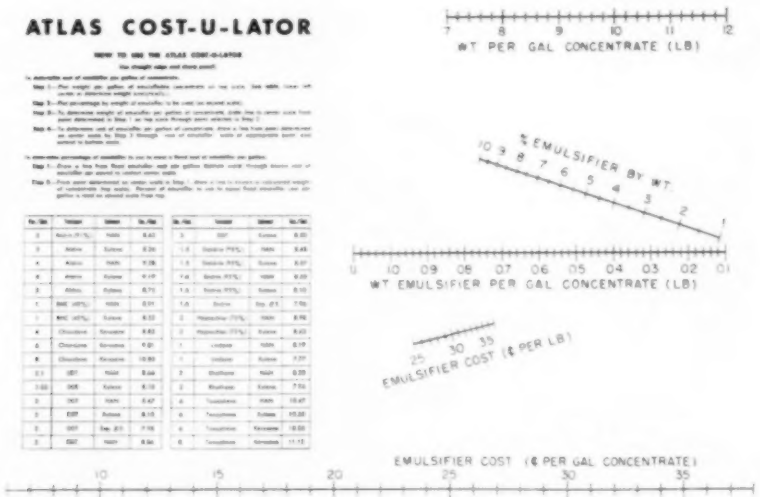
St. Regis Paper Selector

The St. Regis Paper Co., New York, offers a paper selector for multiwall paper bags. The selector, in slide-rule form, is designed for determination of the type of paper best suited to meet individual requirements in multiwall bags.

Circle F-606 on inquiry card page 51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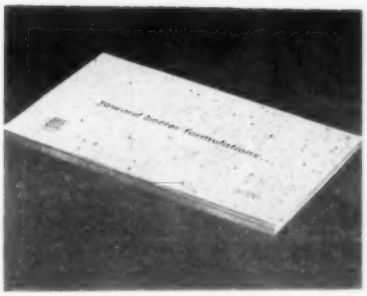


Du Pont Fertilizer Formulation Pad

A new fertilizer formulation pad, particularly suited as a guide for using "Uramon" ammonia liquors, is being offered by du Pont Company's Polychemicals Department as an aid to fertilizer manufacturers. Inside cover of the pad contains such information as composition of fertilizer materials, ammoniation rates of phosphates, miscellaneous conversion factors, and water content of fertilizer materials. The data can be used for calculating the fertilizer grade when using the four UAL solutions: A, B, S and 37.

Circle F-607 on inquiry card page 51

•

Mine Safety Reagents and Kit

Samples, rapid methods and equipment for detecting airborne toxic materials are offered by Mine Safety Appliances Co., Pittsburgh, Pa. The materials may be used effectively in the field by persons having little or no training or experience. Simplicity of test methods giving reasonable accuracy has been achieved through: convenient packaging of reagents (providing for immediate use or for proportionment and use for formulation without measurements) and through the development of simple apparatus for removing toxic materials from measured volumes of air.

Carbon monoxide, hydrogen sulfide, hydrogen fluoride, hydrogen cyanide, arsine, mercury vapor, sulfur dioxide, nitrogen dioxide, aromatic hydrocarbons, and lead (as dust and/or fume) are measureable by these methods when present in air below and above their allowable limits.

Circle F-608 on inquiry card page 51

APPLICATING EQUIPMENT

Transland Ag-2

Transland Division of the Hi-Shear Rivet Tool Co., Torrance, Calif., report that Ag-2 is now available for agricultural and forestry service. Type Certificate #4820 has just been awarded the Ag-2 plane by the CAA.

The airplane, an all metal, low-wing monoplane, is powered by a 600 hp R-1340 engine. It has a complete separate systems for dispensing solids and liquids. Both systems can be controlled singly or simultaneously by the pilot in flight. A 53-cubic foot hopper which holds 2,000 pounds of low-density solids, and up to 3,000 pounds of higher specific gravity materials, is an integral part of the fuselage. Four separate spray tanks and two fuel cells are located in the wings.

The Ag-2 will fly at 80 mph with a full load, and flaps down, using less than 50 per cent engine power.

Circle G-701 on inquiry card page 51

•

Grumman Ag-Cat

First production model of the Ag-Cat appeared this summer. Grumman Aircraft Engineering Corp., Bethpage, L. I., New York, expect to produce four "Ag-Cats" per week by the spring of 1959.

Designed specifically for the agricultural operator, the Ag-Cat features a biplane design that combines maximum wing area with minimum wing span. The plane can execute a continuous 1.5G turn at dusting speed and at a maximum gross weight. Fuselage panels are removable in minutes for hosing out the airplane, and to provide exceptional accessibility to all components. The plane has a profitable payload of 1000 pounds of dust or liquid.

It is designed for installation of a 220-300 hp engine. Cockpit seat, shoulder harness and safety belt are stressed for 40G's. Instant changeover from duster to sprayer is allowed for. Oversized disc brakes assure long wear. The hopper capacity is 29 cubic feet (217 gallons), load restriction is 1000 lbs. Maximum level speed is 110 mph.

See advertisement pages 64, 65

Circle G-702 on inquiry card page 51

•

Call Air Agricultural Planes

Two new agricultural airplanes being offered this year by Call Air, Afton, Wyoming are Models A-5 and A-6, with 150 hp and 180 hp, respectively. The planes feature a Bartlebaugh quick-change unit, or special dust/spray equipment.

See advertisement page 62

Circle G-703 on inquiry card page 51

•

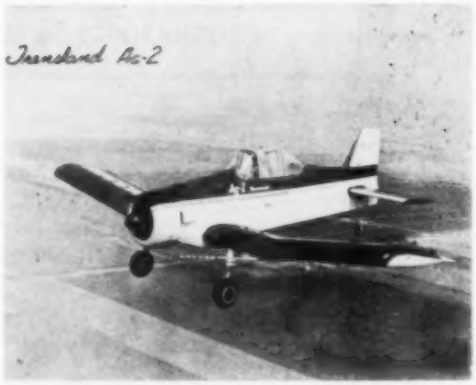
Kellet Ag Autogiro

An autogiro for agricultural dusting and spraying is in production by Kellett Aircraft Corp., Willow Grove, Pa. The autogiro offers aerial applicators most of the advantages looked for in a helicopter. A standard power plant and propeller are mounted in the nose of the giro, and the pilot uses a stick and rudder to control the plane. Kellet point out that in case of engine failure, the rotor is always in "autorotation," and there are no "critical altitudes."

Rotary lift is one of the desirable features of this aircraft for agricultural purposes. Steep climbs and turns are effortless and safe. The autogiro has an empty weight of about 1500 lbs., and a useful load of 800 lbs. Fully loaded, autorotational take off run is 200 ft. under zero wind conditions. Rate of climb of the autogiro is given at 1060 ft./min. and service ceiling as 14,000 ft. Minimum flight speed is only 20 mph, and the ship cruises up to 120 mph. At this time, a 225-hp Jacobs L4-Ma-7 engine is being used with a fixed pitch propeller.

See advertisement page 59

Circle G-704 on inquiry card page 51



Swathmaster Dispenser

A new, all-purpose Swathmaster for aerial application of pesticides, fertilizers, seeds, etc., to farm, range and forest lands was put into production a short time ago by Transland Aircraft, Torrance, Calif. The new aerial dispensing unit permits a single airplane to dust, spray, seed, or apply fertilizer. A plane can change from job to job by means of a simple resetting of controls by the pilot.

The Swathmaster will dispense dry or liquid materials at any swath width. A minimum of 33 feet and a maximum of 100 feet have proven successful in tests at Torrance. Flow rates are limited only by the density of dry materials or the viscosity of liquid materials. For example, a Swathmaster equipped airplane can spray a full and uniform swath at one gallon per acre, and on the next swath, spray at 180 gallons per acre.

The Swathmaster is designed for the Stearman PT-17 plane, and is structurally stressed for aircraft whose speeds do not normally exceed 150 mph. Its effectiveness is being considered for other aerial applicating aircraft such as the Transland Ag-2, Gruman Ag-Cat, Fletcher FU-24, Call-Air A-5 and A-6, Clark, Rhowden and Snow S-2.

Circle G-705 on inquiry card page 51

•

Helicopter for Spraying

Michele Aircraft Corp., Washington, D. C. offers a helicopter-type aircraft, called the "Mike," priced at less than $10,000. The craft has a 100 mph cruising speed, and a 300-mile range. It is suggested as being excellent for crop spraying and dusting.

Circle G-706 on inquiry card page 51

•

Myers Orchard Sprayers

A new line of orchard air sprayers, designed to handle spraying needs of both small and large orchards and groves has been introduced by the F. E. Myers & Bro. Co., Ashland, Ohio. The sprayers have been designed for uniform application of all chemical solutions used currently in orchard and grove spraying. The line is offered in a 224 and 323 series,—both series featuring one-man operation with remote tractor-mounted controls.

Circle G-707 on inquiry card page 51

•

Piper PA-25 Plane

Piper Development Center, Vero Beach, Fla., this month announced their new Piper PA-25 agricultural airplane.

Circle G-708 on inquiry card page 51

•

Baughman Chain Discharge

The Baughman Manufacturing Co.'s K-5 Lime and Fertilizer Spreader Body features a lubrication-impregnated drag chain discharge designed to resist corrosion and eliminate "freezing" of the body's automatic discharge system.

Baughman Manufacturing Co., Jerseyville, Ill., employs a special process to saturate the heavy, malleable block chain discharge with a permanent lubricating agent.

Circle G-709 on inquiry card page 51

•

Harvester's Liquid Fertilizer Applicator

International Harvester Co., Chicago, recently offered a new liquid fertilizer attachment for use on 2-, 4-, and 6-row McCormick trailing corn and cotton planters. The new attachment meters non-pressure liquid fertilizer at rates from 45 to 890 pounds per acre, depending on meter setting and travel speed. Harvester points out that more accurate application of fertilizer is made possible by locating the metering heads close to and directly beneath supply tanks. A clear plastic, liquid-level indicator tube is on the front of each tank.

Circle G-710 on inquiry card page 51

November, 1958

AGRICULTURAL CHEMICALS
Reader Service Dept.
Box 31
Caldwell, New Jersey

Please send me information on the "New Equipment" items circled below.

A-101	B-203	C-308	D-410	E-510	G-703
A-102	B-204	C-309	D-411	E-511	G-704
A-103	B-205	C-310	D-412	E-512	G-705
A-104	B-206	C-311	D-413	F-601	G-706
A-105	B-207	C-312	D-414	F-602	G-707
A-106	B-208	C-313	D-415	F-603	G-708
A-107	B-209	D-401	E-501	F-604	G-709
A-108	B-210	D-402	E-502	F-605	G-710
A-109	C-301	D-403	E-503	F-606	G-711
A-110	C-302	D-404	E-504	F-607	G-712
A-111	C-303	D-405	E-505	F-608	G-713
A-112	C-304	D-406	E-506	F-609	G-714
A-113	C-305	D-407	E-507	F-610	G-715
B-201	C-306	D-408	E-508	G-701	G-716
B-202	C-307	D-409	E-509	G-702	G-717

Your Name ..... Title .....

Company .....

Company Address .....

City ..... Zone ..... State .....

Hahn Hi-Boy Sprayer

Hahn Manufacturing Co., Evansville, Ind., offer the Hahn Hi-Boy Sprayer, a high-clearance, self-propelled tractor mounted unit.

Circle G-711 on inquiry card page 51

•

Iron Age Spra-Blast Unit

A. B. Farquahar Division, Oliver Corp., York, Pa., have developed the Iron-Age Spray Blast unit, designed to eliminate any tendency to spray high on one side and low on the other. Specially shaped vanes correct this tendency.

Circle G-712 on inquiry card page 51

•

Liquid Application Equipment

Tryco Manufacturing Company, Inc., Decatur, Ill., has worked directly with liquid fertilizer manufacturers for several years in the development of application equipment. They have recently offered a liquid fertilizer applicator.

The basic unit is a heavy duty trailer. To obtain the proper combination of equipment which will correctly apply the liquid being used, Tryco offers steel or aluminum tanks, pumps or compressors, stainless steel booms for top dressing or tool bars for side dressing.

Circle G-713 on inquiry card page 51

•

Champion Power Sprayers

A new heavy-duty power sprayer has been offered this year by Champion Sprayer Co., Detroit. The 1958 Champion "600" offers growers, orchard and vineyard operators, farmers, ranchers and dairies increased capacity and increased pressure. A 2 hp engine drives a one-cylinder, vertical pump delivering three gallons per minute at a maximum pressure of 400-pounds. Pressure is readily lowered to 25 pounds. The sprayer is available with tanks of 30, 50 or 100-gallon capacity. Other models are available with greater capacity or of the hand-operated type.

Circle G-714 on inquiry card page 51

•

Applicator for Top Dressing Solutions

General Metals, Inc., Greensboro, N. C. is offering a trailer-applicator, Model TPD-200 for top-dressing of nitrogen solutions or complete liquid fertilizers. The applicator consists of a heavy-duty trailer, large aluminum tank, metering pump, and all-steel boom. Solutions can be applied on 150 to 200 acres per day.

Circle G-715 on inquiry card page 51

•

3-Hopper Fertilizer Truck

Southern States Cooperative, Richmond, Va., has announced the development of an "Even Spread" fertilizer spreader truck that, it is claimed, takes basic plant food ingredients directly from the mine or processing plant, meters them individually as it covers the field, and spreads them evenly.

The truck is a three-hopper, continuous-feed unit. It is a sequel to the company's three hopper "Gandy" spreader developed some time ago. The Gandy spreader was pulled by a tractor. The new truck is an improvement in that a tractor no longer need be used and no truck is needed to haul bags of material out to the spreader. The truck also eliminates mixing plant costs.

The Even Spread truck is said to be capable of putting down any rate of N, P, or K, and at the same time can put on minor elements from a small fourth hopper. The first Even Spread truck was given pilot project testing at the co-op's bulk plant at Culpepper, Va., in the fall of 1956. Since then, nine Southern States service agencies in four states have used the trucks.

Circle G-716 on inquiry card page 51

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There is nothing that appeals to a man's reason more than plain facts. And, one plain fact is this . . . you can help yourself to bigger profits by resolving **now** to replace wasteful obsolete plant equipment with the latest rock-bottom cost methods as exemplified in Sackett Production Processes and Materials Handling Equipment. Why not start the ball rolling by writing or phoning us today?

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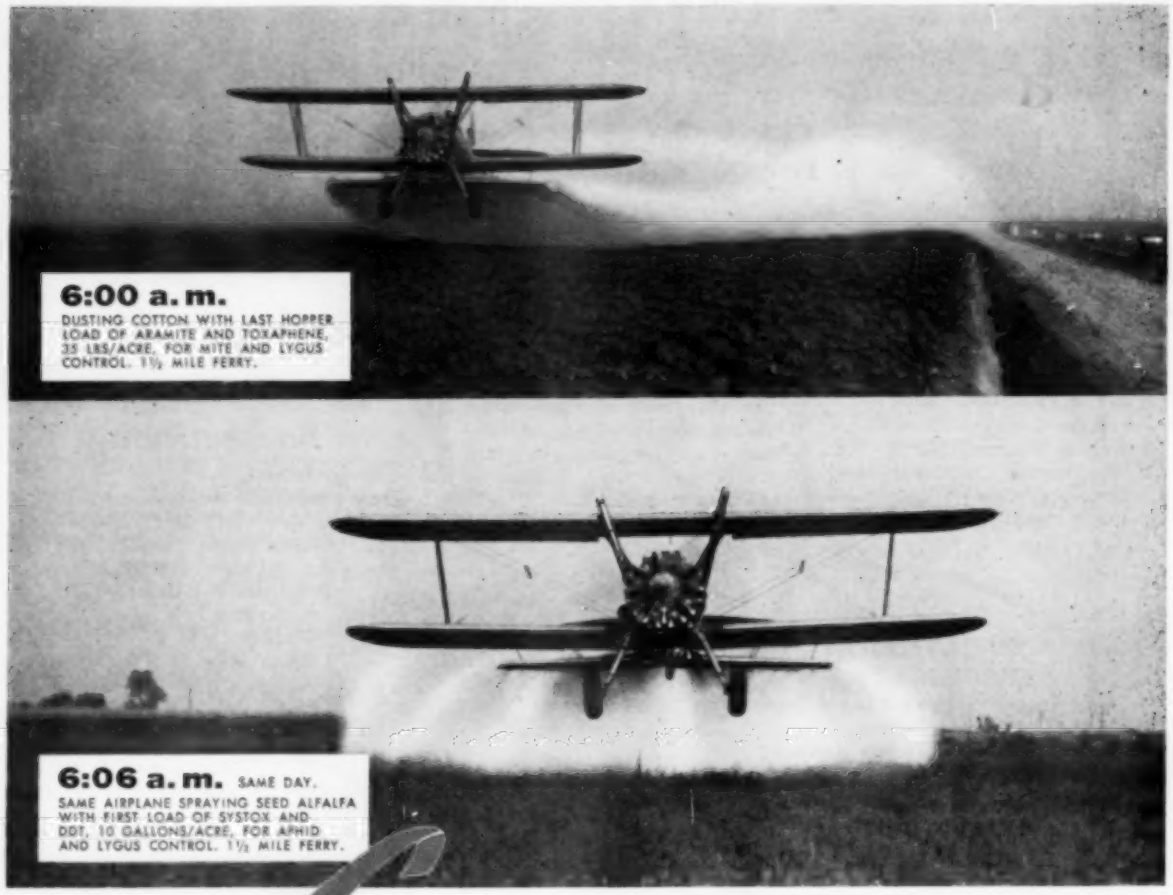
6:00 a.m.
DUSTING COTTON WITH LAST HOPPER LOAD OF ARAMITE AND TOXAPHENE, 35 LBS/ACRE, FOR MITE AND LYGUS CONTROL. 1½ MILE FERRY.
6:06 a.m. SAME DAY.
SAME AIRPLANE SPRAYING SEED ALFALFA WITH FIRST LOAD OF SYSTOX AND DDT, 10 GALLONS/ACRE, FOR APHID AND LYGUS CONTROL. 1½ MILE FERRY.

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THE CUSTOM *Applicator*

NATA Meeting In Milwaukee

Autogiro Enters Spray Field

The Ag. Frequency Solution

Grumman Flies Production Model of Ag-Cat

Among NATA officials who will preside at the Milwaukee meeting Nov. 11-14 are: (Upper left) Charles A. Parker, executive director of NATA; (Upper right) Robert E. Monroe, assistant executive director of NATA; (Lower left) A. Biederman, vice president — technical trades of NATA and president of A. Biederman Precision Instrument Laboratories, Glendale, Calif.; and (Lower right) William J. Latzer, president of the NATA and president of Gran-Aire, Inc., Milwaukee, Wisconsin.

Applicator Sessions to be Feature of National Aviation Trades Meeting

THE 19th annual convention of the National Aviation Trades Association, being held at Milwaukee's Pfister Hotel, Nov. 11 to 14, will feature three days of sessions of interest to aerial applicators. Among the topics to be covered are; applicator safety, research, contracting, and regulations.

Tuesday, Nov. 11, will be devoted to maintenance under the leadership of the National Aviation Maintenance Council. The morning session presents speakers from CAA on general maintenance policy in primary problem areas and modifications and changes in type design and STC processing. NAMC chairman, A. Biederman, will review Defense Department policy with respect to contract maintenance. In addition, a speaker from industry will present facts and recommendations on this subject.

In the afternoon, a panel of speakers will cover customer service followed by a panel with representatives from Beech, Cessna, Piper, Continental, Lycoming, NA RCO, and Pioneer Aircraft Companies on recommendations for better service for improved customer relations.

A breakfast on the meeting's second day will open the applicator sessions. John F. Neace, president of Neace Aviation, Litchfield Park, Arizona, and a former vice president of the NATA, will present an address entitled: "Business From the Moron's Viewpoint."

At noon, there will be an applicator committee luncheon and a general applicator session is scheduled for that afternoon. The "Ag. Frequency Solution" is the title of a talk to be given by Robert E. Monroe, Assistant Executive Director of the NATA. The full text of Mr. Monroe's talk appears on page 67 of this issue. Nathan Boruszak, sales engineer, Motorola Communications & Electronics Inc., Chicago, will report on business and special industrial radio equipment at the general session, and Fred E. Weick, director of the Piper Development Center, Vero Beach, Fla., will describe the Piper PA-25 agricultural airplane.

Walter Kusiak, field service representative for Pratt & Whitney Aircraft, East Hartford, Conn., will outline R-985 operations and maintenance for applicators.

An applicator research meeting will hear O. J. Scoville, economist with the Farm Economics Research Division, U. S. Department of Agriculture, discussing economics and business management for aerial applicators. Progress reports and developments in agricultural application will be covered by B. C. Reynolds, agricultural

(*Continued on Page* 62)

Wednesday, November 12

8:15 Applicator Breakfast
"Business From the Moron's Viewpoint"
John F. Neace, Neace Aviation Corp.

12:00 Applicator Committee Luncheon

2:00 General Applicator Session
"The Ag. Frequency Solution"
Robert E. Monroe, Asst. Executive Director, NATA
"Business and Special Industrial Radio Equipment"
Nathan Boruszak, Motorola Communications & Electronics, Inc.
"The PA-25 Agricultural Airplane"
Fred E. Weick, Piper Development Center
"R-985 Operations and Maintenance for Applicators"
Walter Kusiak, Pratt & Whitney Aircraft

3:45 Applicator Research Session
"Economics and Business Management"
O. J. Scoville, Farm Economics Research Division, USDA
"Developments in Agricultural Application"
B. C. Reynolds, Experiment Stations Division, ARS, USDA
"Developments in Forest Application"
Ira C. Funk, Fire Control Forest Service, USDA
"Research"
W. M. Carleton, Agricultural Engineering Research Division, ARS, USDA

Thursday, November 13

10:00 Applicator Contracting Session
"ARS Policies and Outlook"
E. D. Burgess, Plant Pest Control Division, ARS, USDA
"ARS Program Operations"
Arthur Gieser, Methods Improvement Section, ARS, USDA
"Forest Service Policies and Outlook"
W. V. Benedict, Division of Forest Pest Control, FS, USDA
"Forest Service Program Operations"
John M. Whiteside, Insect Control Section, FS, USDA

2:00 Applicator Safety Session
"Technique and Psychology of Safety Persuasion"
E. Clarke Woodward, A. O. Smith Corporation
"Safety and Accident Investigations"
Speaker to be announced

3:45 Applicator Regulation Session
"Regulative Proposals and Considerations"
Jay A. McCausland, Civil Aeronautics Administration
"Part 75 Development"
Robert E. Monroe, NATA

Friday, November 14

10:00 Applicator Business Session

An autogiro laying a swath of agricultural chemicals has a minimum speed of 20 miles per hour. A pilot can clear trees and other obstacles with a minimum interruption of spraying operations.

Kellett Uses Autogiro For Aerial Applicators

AN autogiro is being prepared for entry into the aerial applicating field by the Kellet Aircraft Corp., Willow Grove, Pa. Although not new to agricultural work—autogiros for spraying were first tested against the gypsy moth in Massachusetts in 1937—the Kellett autogiro is believed to be the first offered to aerial applicators since World War II.

In 1937 there were less than 200 planes registered for insect control work. Today, however, the number listed by the Civil Aeronautics Administration is close to 5,000, and the need for new equipment to replace converted, war surplus planes is increasing.

The original Kellett autogiro was flown extensively by the U. S. Army before the war. The two-place version of the plane was designated as the YG-1. Kellett autogiros were used in the Byrd Antarctic expeditions, and were flown by Eastern Airlines in 1939 and 1940 to shuttle the U. S. mail between the roof of the Philadelphia Post Office and the airport in Camden, N. J.

The Kellett autogiro was originally developed 20 years ago and the plane's basic design is being followed in the craft now being built. It is certified by CAA for commercial sales with type certificate No. 712. It is in the "Standard" category, and is not, therefore, restricted to agricultural use. The original model of the plane was designated the KD-1.

Building the new prototype again is no problem, according to Kellett. The same basic engines and parts formerly used are in good supply. Certified and ready to fly with CAA approval, the plane being constructed will debut this winter and orders may be delivered next spring. The plane was introduced at the National Flying Farmers Association convention in New York last August by I. Medgebow, Kellett vice president. Mr. Medgebow spoke at the meeting and showed a motion picture of an autogiro dusting a vegetable farm in New Jersey.

With no stall point, the Kellett autogiro offers aerial applicators most of the advantages they look for in a helicopter, but it is not a helicopter. It is an airplane

Air flowing through the rotor is deflected down to the ground resulting in a gentle ruffling of crops and complete and accurate coverage of the spray area. The Kellett autogiro uses a standard airplane engine that requires no special cooling.

with a rotating wing. A standard power plant and propeller are mounted in the nose. The pilot uses a stick and rudder to control the autogiro in just the same manner as he would a conventional plane. According to Kellett, any light plane pilot can check out in the dual control autogiro with about three hours of instructions. An autogiro pilot is not required to hold a helicopter rating.

There are no complex power-driven rotor systems, and the plane needs no anti-torque rotor on the tail. In case of engine failure, the rotor is always in "autorotation," and there are no critical altitudes.

Among the desirable features of this aircraft for agricultural purposes listed by the Kellett Corp. are rotary lift and effortless steep climbs and turns. Takoff requires no runway and landing can be accomplished in a space just a little larger than the diameter of the rotor blades. This means that chemicals can be reloaded at the field being sprayed.

The autogiro has an empty weight of about 1,500 pounds and a useful load of 800 pounds. Fully loaded, completely autorotational takeoff run is 200 feet, under zero wind conditions. Climb and descent are accomplished by a combination of rotor tilting and power application. The rudder is used for assistance in turns. The simplicity of the controls enables the pilot always to have one hand free to operate hopper or valve controls.

Rate of climb of the autogiro is given at 1,060 feet per minute, and service ceiling is 14,000 feet. Minimum flight speed is only 20 mph and the ship cruises at speeds up to 120 mph. An accomplished pilot can land the autogiro with no forward ground roll, according to Kellett.

Controlled flight characteristics at very low speeds approaching hovering make the autogiro especially suited for agricultural work. A pilot can clear trees and other obstacles with a minimum interruption of spraying operations. In the event of engine failure, the free-wheeling rotor alone can safely set down the autogiro.

Air flowing through the rotor is deflected back to the ground, resulting in a gentle ruffling of crops and downward deflection of materials being sprayed. The company points out that this cuts waste and makes for complete and accurate coverage.

The economy of construction and maintenance is comparable to fixed wing aircraft and makes the autogiro adaptable to a wide variety of jobs. The company reports that no special training is required for an experienced A & E mechanic, using only the erection and maintenance manual, for transition to autogiro systems. Down time for maintenance is cut, according to Kellett, because the parts and assemblies are not delicate or complicated. The plane uses a standard airplane engine that requires no special cooling and is mounted in a conventional accessible manner. The spare parts inventory is said to be relatively small for a rotary wing aircraft.

At this time, a 225-hp Jacobs L4-MA-7 engine is being used with a fixed pitch propeller. The engine can be started by swinging the prop by hand, in event of battery failure, and air starts may be made as easily as with an airplane.

Wingless the autogiro presents very little storage problem. Its rotor span is 40 feet, but the rotor blades may be folded back over the tail. Occupying a space 10 feet, 10 inches high; 10 feet, three inches wide; and 26 feet long, it can fit in most barn or tractor storage sheds. Also in this manner it can be taxied in confined areas, or towed behind a truck for any distance over roads.

Cockpit arrangements will make the new ship versatile, according to the manufacturer. The two-place tandem configuration can be converted with either a tank, hopper, or seat in the forward position. The current prototype models will have complete dual controls for demonstration and training purposes.

James T. Duffy Jr., president of Kellett Aircraft Corp., predicts that the plane will be adapted to a wide variety of uses in addition to aerial spraying and dusting, such as pipeline inspection and forest patrol. Based on the current market, the autogiro is expected to sell for approximately the same as standard aircraft with similar capacity.

(*Continued on Page* 120)

An old photo shows mail being loaded into a Kellett autogiro for air mail route between Philadelphia and Camden, N. J. The forward compartment being used for mail here will be the chemical hopper on the Kellett crop duster autogiro.

NOW...ONE MIDWESTERN SOURCE FOR THREE BASIC FERTILIZER MATERIALS

With the addition of a phosphatic solution plant to its chemical complex at Tuscola, Illinois, U.S.I. can now supply a large area in the Midwest with a variety of fertilizer materials that will meet all your needs for these components:

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Grumman Flies First Production Model of "Ag-Cat" Crop-Duster and Sprayer

THE first flight of the number one production model of the Grumman Aircraft Engineering Corp.'s new agricultural biplane, the Ag-Cat, was made at Elmira, N. Y., on Oct. 17. The flight was made at the facilities of the Schweitzer Aircraft Corp., sub-contracting producers of the new Grumman plane.

The Ag-Cat will be certified under C.A.R.'s part 8. It is anticipated that licensing will be completed early this month. The all-new airplane was designed specifically for the agricultural market as a crop-duster and sprayer. The airplane features the interchangeability of upper and lower wings and all four ailerons; maintenance-free, spring steel landing gear; and a sloping nose which affords excellent visibility in normal flight attitude. Both the airspeed indicator and the engine tachometer are placed forward of the cockpit on a separate panel to minimize the pilot's eye focusing problem when flying in close proximity to the ground.

To assure an even distribution of chemicals on crops, Grumman spent over three months conducting distribution studies at the Texas A & M College measuring station. More than 200 flight runs were made over sensitive scales which measured actual distribution of the chemicals dispensed. Spray nozzles on the Ag-Cat were placed accordingly.

Specifications for the airplane include an overall length of 24 feet, 4 inches; a wing span of 35 feet, 8 inches; and a height of 10 feet, 9 inches. It will be licensed for a gross weight of 3,750 pounds which allows a comfortable margin for any future airplane growth. Hopper capacity is 29 cubic feet

(*Continued on Page* 108)

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PEST ROUNDUP

By Kelvin Dorward

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

General Insect Conditions In Late September

ALTHOUGH the season was rather late for the majority of insects to be an economic problem, several were still quite active during late September. Grasshoppers, which earlier in the summer were responsible for approximately 5,000,000 acres of range, idle lands, roadsides and public domain being treated with insecticides, were still active in widely separated areas. Early in September, hoppers caused considerable damage to field corn and ornamentals in the Conesus area of Livingston County, New York. In Alabama, grain sorghums were damaged. During the latter part of September, field margins were damaged in several counties in the panhandle of Texas, and controls were applied in one area of Cimarron County, Oklahoma. In that area of Oklahoma, approximately 20 per cent of the grasshopper population was being affected by the sarcophagid parasite. In New Mexico, hoppers continued to be a problem in several areas. Controls were applied in Taos County, and replanting of the margins of grain fields was necessary near Mosquero, Harding County. Damage to winter wheat continued in the Bowman areas of North Dakota, and populations were heavy in parts of Utah County, Utah.

Damage from the European corn borer continued to be reported in late September. The borer was heavy in grain sorghums in Westmoreland County, Virginia, with approximately 90 per cent of the stalks beginning to break at point of entry. Louisiana reported the European corn borer in the western Parishes of Ouachita, Bossier, Caddo, Red River and Natchitoches; while Alabama reported Tallapoosa, Elmore and Montgomery Counties infested for the first time.

The corn earworm was heavy in late field corn and grain sorghum in northern Alabama. In check plots of late sweet corn, infestations were as high as 96 per cent at Marietta, Ohio; 81 per cent at Wooster, and 52 per cent at Toledo. Corn earworm damage to sweet corn in Columbia County, Wisconsin exceeded that caused by the European corn borer and fall armyworm combined. Infestation in field corn ears was almost 100 per cent in several New Mexico counties, and was high in both late field and sweet corn in Utah County, Utah.

Th fall armyworm was causing damage in several areas during the latter part of September. This insect was responsible for heavy feeding in late field corn of Kent County, Delaware, and to sorghum in Eastern Shore Counties of Virginia. Heavy populations were reported from corn and sorghum fields of northern Alabama, in central Texas and on corn in Escondido, San Diego County, California.

Heavy populations of the pea aphid were reported from Delaware alfalfa in mid-September, but was decreasing in some areas by the latter part of the month. Population build-ups were reported from areas of Nebraska, New Mexico, Utah and California.

In late September, the spotted alfalfa aphid was reported from Oregon for the first time. There was indication of this pest building up in Nebraska,—but elsewhere it has not been of too great concern this season.

Among the fruit insects, the codling moth was still active during late September. The insect was unusually heavy in the Moscow, Idaho area this year, and normal practices failed to prevent infestations of fruit. Third-brood larvae were still entering fruit in large numbers in Virginia during late September, with the largest third-brood in several years in the central part of the state. Mites were heavy in localized areas of California on cherry and pear trees, peach trees in Oregon, and apple in Utah. In Larimer County, Colorado, these pests caused tree defoliation.

The cabbage looper was one of the most important truck crop insects during Septetmber. Heavy damage was inflicted to cabbage and cauliflower in the Winter Garden area, Dimmit County, Texas, and to tomatoes in Brazos County. Lettuce was damaged in Dona Ana and Eddy Counties, New Mexico, and populations were heavy on tomatoes in the Woodland area, Yolo County, California. Earlier in the month, the insect continued to be serious on cabbage, and populations exceeded those of the past several years in several northwestern Oregon counties.★★

NATA CONFERENCE

(From Page 56)

engineer, Experiment Stations Division, U.S.D.A.

Ira C. Funk, chief of the Aeronautics and Equipment Division of the Fire Control Forest Service, U.S.D.A., will present progress reports and tell of developments in forest applications. General research will be discussed by W. M. Carleton, assistant director of the Agricultural Engineering Research Division, ARS, U.S.D.A.

An applicator contracting session on the meeting's third day is planned so that aerial applicators will have a chance to study government contract program problems, safety matters, and regulatory proposals. E. D. Burgess, director of the Plant Pest Control Division, ARS, U.S.D.A., will list the policies and outlook of the Agricultural Research Service. The ARS program operations will be outlined by Arthur Gieser, Methods Improvement Section, ARS, U.S.D.A.

Forest Service policies and outlook are to be discussed by W. V. Benedict, director of the Division of Forest Pest Control, Forest Service, U.S.D.A. John M. Whiteside, chief of the Insect Control Section, Forest Service, will tell of the program operations of the Forest Service.

An applicator safety session will hear about the technique and psychology of safety persuasion from E. Clark Woodward, safety director of A. O. Smith, Milwaukee. Representatives of the Bureau of Safety, Civil Aeronautics Board, also will be on hand to discuss safety and accident investigations.

Applicator regulations will be covered by Jay A. McCausland and Mr. Monroe, in a closing session of the convention. Mr. McCausland, who is an agricultural-industrial specialist with the General Operations Branch of the Civil Aeronautics Administration, will discuss regulatory proposals and considerations. Mr. Monroe will outline the development of Part 75 of the regulations.

The aerial applicator portions of the convention are scheduled to be closed with a business meeting on Friday morning, Nov. 14.

The NATA business session will close the convention on Friday afternoon. William Lotzer, Gran-Aire, Inc., Milwaukee, is president of the NATA and Ed. B. Oliver, Volusia Aviation Service, Daytona Beach, Fla., is the treasurer. Eastern vice president is Richard R. Washburn, Southern Flight Service, Charlotte, N. C., and Western vice president is Larry Hunt, Air Oasis Co., Long Beach, Calif.

Among the industrial vice presidents are: J. L. Rhodes, Atlantic Aviation Corp., Wilmington, Del., Maintenance; A. Biederman, Glendale, Calif., Technical Trades; and Roy O. Mahon, Mahon's Boot Hill Flying Service, Dodge City, Kansas, Sales & Service. Gale Hansen, United-Heckathorn, Inc., Hayward, Calif., has been vice president for agriculture during 1958.

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LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Control of Bacterial Spot and Ripe Rot of Pimiento Pepper

W. A. Chandler[1], of the Georgia Experiment Station, states that about 20,000 acres are planted to pimiento peppers in Georgia every year. Bacterial spot *(Xanthomonas vesticatoria)* and ripe rot *(Vermicularia capsici)* are important diseases, while *Cercospora* leaf spot *(cercospora capsici)* is less serious but sometimes causes loss.

A number of chemicals were tested for effectiveness against these diseases in 1956 and 1957. Plants were sprayed eight or nine times at intervals of 1 to 2 weeks, starting about the time the first pods were forming (on July 3 in 1956 and on July 2 in 1957). Materials were applied by a high-pressure sprayer at 350-pound pressure, using three nozzles per row. Rate of application was 100 to 125 gallons per acre. To lessen mechanical injury to the plants, the spray equipment cleared the ground by 28 to 30 inches.

In both years, the plants used were the Truhart Perfection variety. In 1956, the plants were grown in the greenhouse. In 1957, field-grown plants from Florida were used. Plants were set out about May 1. Rows were 3½ feet apart, and plants were 2½ feet apart in the rows. Each 1/124-acre plot contained two rows with a total of 40 plants. There were four replications.

Incidence of bacterial spot, which occurred both years, was recorded by percentage counts of infected leaves made September 12 in 1956 and August 26 in 1957. Slight scattered infection of pods was noted, but the leaf data were considered more reliable for judging control of bacterial spot. *Cercospora* leaf spot incidence was negligible both years and no data were recorded for it.

Pods were picked every two weeks from August to October, five pickings in all. For each plot, records were made of the total weight of pods and of the weight of pods showing ripe rot.

To correct the yield figures for plants missing from various causes, stand counts were made immediately before or after each picking. By the end of the season, the loss of plants for the whole field was 22 per cent in 1956 and 13 per cent in 1957.

Results: In 1956, ripe rot occurred only in trace amounts; there was none in the unsprayed plots.

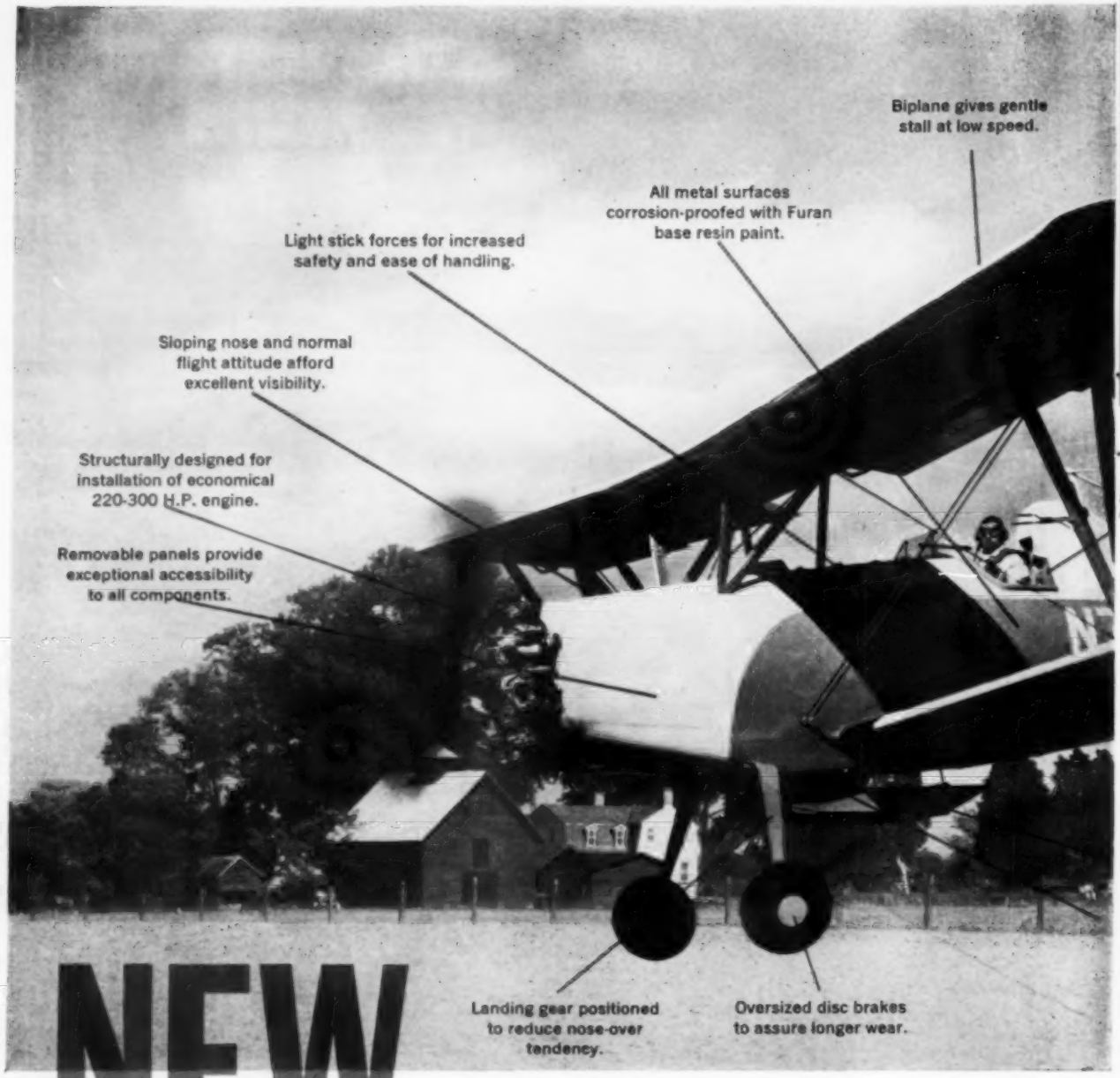
1957 results showed that bacterial spot control was good with Dyrene (2,4-dichloro-6-(*o*-chloroanilino)-*s*-triazine), Tribasic copper sulfate, and the streptomycin mixtures except the one with Phaltan (N-trichloromethylthiophthalimide). Ripe rot control by the streptomycin mixtures with copper (Agri-mycin 500), maneb, and thiram was somewhat better than by these fungicides used alone. Phaltan by itself, on the other hand, gave better control than in the mixture with streptomycin. There seemed to be an additive effect from the streptomycin plus copper in both Agri-mycin formulations.

Chlorosis, some defoliation, and decrease in yield resulted from treatment with Dyrene in 1956 and 1957, and with the thiram-streptomycin mixture in 1957. In 1957, yields from these plots were significantly lower than those from the unsprayed check plot. The thiram-streptomycin mixture resulted in significantly smaller yields than thiram alone. The other streptomycin mixtures did not produce any apparent injury or yield reduction.

Since it is rather difficult to achieve thorough wetting of leaves and pods of the pepper plant, the effect of adding a surfactant (wetting, spreading, and sticking agent) to some of the materials tested was compared with results obtained with the same materials used alone. Triton B-1956 was used in 1956 and 1957, and DuPont spreader sticker was used in 1956. In 1957, bacterial spot control was slightly better, and yield was somewhat greater with than without the surfactant; but none of the differences were significant. In 1956, there were no favorable effects; on the contrary, maneb and thiram used

(Continued on Page 113)

[1]W. A. Chandler, "Control of bacterial spot and ripe rot of pimiento pepper," *Plant Disease Reporter*, vol. 42, no. 5, pages 652-655, May 15, 1958. (Tables appear in original article giving results with specific treatments in 1956 and 1957).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The "Ag-Frequency" Solution

by Robert E. Monroe *
National Aviation Trades Association
Assistant Executive Director

AERIAL applicators began sensing a need for better communications between the elements of an applicating team several years ago. This need still exists.

Once a team is in the field and working, it is mute. Hand, body, and airplane signals are inadequate. The outstanding and constant requirement is for communications between pilot and flagman for purposes of information, correction, and warning. Need also exists occasionally for communications with loaders, mixing trucks, and base operations. On governmental programs, provision of communications between the spray plane and the chase plane now is a contractual requirement.

Aerial applicators can see many benefits from adequate communications. Errors in flying and flagging can be prevented or more easily corrected without loss of time. Critical changes in spraying conditions, such as temperature or wind variations, can be made known without delay. New or unnoticed hazards can be brought to the pilot's attention. Job-site changes can be executed more efficiently. And changes in the day's work program can be made easily and personnel notified promptly.

Earlier efforts to establish radio contact between elements of a spraying team involved the use of special industrial service radio equipment and met with substantial failures. The sets were too bulky, too heavy, too low powered, suffered serious static and ignition interference, and the antennae were next to impossible for airplanes. Created for taxis and heavy ground equipment, they proved unsuitable for aircraft, particularly where payload already was marginal.

Last year, a resolution adopted by the National Aviation Trades Association directed the association to ask the Federal Communications Commission to establish a radio frequency in the aeronautical communications band for the use of dusters and sprayers in aerial application work.

Casual approaches to FCC personnel were followed by formal presentations in March of this year. In April, the FCC denied the request, as it had previously, following similar approaches in 1953 and 1955.

Subsequently, contacts were made with other governmental agencies that have a related interest in the establishment of an applicator radio frequency. Bolstered with some support from these; documentary evidence of the need; parellels drawn from search and rescue, flight test operations, and Unicom, a frequency in the aeronautical communications band for fixed base advisory stations; and implications of action through congressional sources, the NATA returned to the FCC. This time, the impression was that NATA probably could get such a frequency but it would almost certainly have to be on a shared basis, and its usage would be severely restricted to matters directly concerned with safety of the aircraft.

Meanwhile, the Federal Communications Commission changed some of its rules, created a new business radio service, and allocated new frequencies to the special industrial radio service. At the same time, manufacturers developed light-weight, battery-powered, portable equipment that would not suffer from static and ignition interference. For the first time, a radio service and the equipment to use it became available at the same time, and in forms which applicators could use and afford.

The FCC suggested that applicators use this new service and equipment, which would not be restricted to pure safety messages but could be used whenever and wherever necessary in their operations. After weighing all aspects of the problem, the NATA directorate agreed that the new service and equipment would offer a better solution to the overall communications problem in applicator operations. Further pursuit of a freguency in the aeronautical band was abandoned.

NATA has approached manufacturers concerning equipment specifications, availability, and price. It also invited them to appear at NATA's convention in Milwaukee this month and display their products.

Two radio services now are open to applicators: business and special industrial.

Business radio service is open to anyone engaged in a lawful business, educational, or religious enterprise. For example; doctors, grocery stores, and trucking outfits are eligible. While new, it is expected that its use will expand fairly rapidly and interference may become a problem.

Special industrial radio service is restricted to certain kinds of businesses and also provides for voluntary frequency coordination by users. It should, therefore, pro-

(*Continued on Page* 111)

*Address presented at the NATA convention, November 12, Milwaukee, Wisc.

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Fertilizer Views and News

By Vincent Sauchelli

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

That Low Stave on the Barrel—

YOU are all familiar, no doubt, with that picture of a barrel having staves of different length, and the admonition that this barrel will hold no more than the level of the lowest stave. Such a convincing picture appeals to one's common sense as unquestionably true. By analogy, that truism has been applied to the explanation of plant nutrient deficiency to support Liebig's "law of the minimum"—a crop can be no higher than the level of the lowest plant nutrient. We have often been cautioned that carrying an analogy too far has its pitfalls. It is the belief of many soils men and biologists that this "low stave" analogy has been misused in efforts to explain soil nutrient deficiencies. Emil Lang in 1924, discussing the law of the minimum (1) said: "Should the progress of our knowledge actually lead to the minimum law, sometimes becoming superfluous, it will be especially difficult to force it out of the attics of our agricultural schools, where in the course of time it has become a cabinet specimen in the museum of rural culture."

The force of a good picture to impress on the mind of the reader a certain concept—right or wrong—was never better exemplified than in this low barrel stave illustration.

Liebig's law of the minimum states that the nutrient present in the least relative quantity determines what the crop yield shall be. If, for example, a soil contains enough nitrogen for a crop of 50 bushels per acre, enough phosphorus for 60 bushels and enough potassium and other nutrients for 70 bushels, the crop that can be produced will be 50 bushels only, because that is the size of yield that is governed by the limiting factor, nitrogen in this case. Little is gained by having the other nutrients present in relatively larger amounts than the nitrogen, until the nitrogen level has been raised as high as the next-lowest limiting nutrient, and so on. In other words, the yield is directly proportional to the amount of nutrient present in the soil.

Nutrient Requirements of Plants

It has long been understood that a mixed fertilizer must supply nitrogen, phosphorus, potassium, sulfur, magnesium, calcium and trace elements in forms that can be assimilated by the roots of plants. Each of these nutrients is essential to plant life. Early in this century, agronomists and soil scientists began to investigate exactly how plant nutrients acted, quantitatively, to sustain and promote plant growth. Liebig had shown back in 1840 that plants feed on inorganic minerals present in the root zone, and many scientists have since then enlarged the study of plant nutrition. It was not until E. A. Mitscherlich in Germany published his investigations around 1909, however, that a fruitful technique was evolved for definitely determining, quantitatively, the action of nutrients involved in plant growth.

Mitscherlich reasoned that all plants feed on the same group of nutrients, N, P, E, Mg, Ca, S, and so on, and that each is as essential as any other; meaning that, if even one is missing, the plant fails to develop. Agronomists had from experience and observation concluded that the absolute quantities of these different nutrients are of importance. If there is a deficiency in soil nitrogen, for example, the crop will be short, regardless of how abundant the others may be. If, now, the nitrogen content of this poor soil is somewhat increased, the yield will be increased to a certain degree; if the amount of nitrogen added is further increased, the yield will be further increased, assuming always the other nutrients are still present in abundance and, of course, availability of adequate moisture. However, this process cannot be carried out indefinitely. There is a limit to the growth of any plant, even in the most fertile soil. Hence, beyond a certain level of nitrogen in the soil, it is found that any addition beyond this point will not bring forth any additional yield. This fact has been described

(*Continued on Page* 115)

(1) Spillman, W. J. & Lang, E. (1924). The Law of Diminishing Returns. World Book Company, Chicago.

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WASHINGTON REPORT

By Donald Lerch

WHILE most of the world's 2 billion and some people are still begging for food, Americans this year are looking forward to one of the richest harvests in history.

Despite efforts of both Republicans and Democrats to limit farm production, farm output totals will be a near record high. This record is the result of one of the really encouraging facts of our times; namely, the continuing advance in farm output per man hour.

This already has gone up 40 per cent since 1930. Now, government economists predict output will advance another 40 per cent in the next ten years. Industrial output per capita is expected to rise 35 per cent over the next decade, and population will go up 20 per cent. As productivity increases faster than population—per capita income of the people goes up. Government economists expect a rise of 30 per cent in U. S. per capita income in the next ten years. This means everyone will be able to buy more and enjoy more in the days to come.

Study these facts:

A bag of food that cost an average worker 6 hours of labor in 1933 costs only 3¾ hours of labor today. Back in 1914—rib roast cost 20 cents a pound. Even at today's prices, it takes less than half as much work to buy a pound of beef as it did 25 years ago. This is the continuing trend as seen from Washington.

Manufacturers of chemical fertilizers and pesticides can take a bow for their tremendous contributions to this trend. As farm production efficiency zooms—per capita income and living standards also go up.

Not all farmers either understand or welcome this upward trend in farm efficiency. Agriculture Department figures show that farmers who use the newest products and practices are producing more efficiently. They are becoming bigger and more prosperous. Farmers who are not keeping up with the latest advances, however, are finding it harder to make both ends meet.

Farm-wise politicians tell us that farmers who are falling behind because of slowness in adopting new practices, are blaming politicians instead of themselves for their plight. This growing attitude on the part of many farmers may result in the switching of their votes in this month's election

In many ways, the farm revolution, sparked by chemical fertilizers and pesticides, is forcing farmers to learn new methods, to use new practices in farm production. This is the path to progress and to rising standards of living for farmers as well as consumers.

As it looks from Washington, at least, chemical fertilizer and pesticide manufacturers have a big stake in educating farmers and consumers to the benefits they can expect from increasing farm production. At the same time, every company must be alert to protect the nation's investments in production research.

Growing productivity on the farm already is inclining politicians toward putting greater emphasis on utilization research; that is, research to find new ways to use farm products. While this kind of research has great merit, any slowdown in production research will tend to hamper continued progress toward more efficient production and a rising standard of living.

Fortunately, both the National Plant Food Institute and the National Agricultural Chemicals Association are taking the lead in informing farmers and consumers on values of increasing farm production efficiency. NAC's new booklet, "Open Door To Plenty," is the most recent example of the Association's continuing efforts to keep the public up-to-date on chemical farming progress.

* * * * *

Agriculture Secretary Ezra Taft Benson recently tallied up some of the benefits farmers have been getting from more efficient farm production. Realized net income of farm operators for the first three-quarters of 1958 is estimated at 19 percent higher than for the same period in 1957. Farm assets, farm ownership, and per capita farm income are at the highest levels in history.

And here are surprising figures for suburbanites to ponder. Two out of three farms are completely free of mortgage debt. Farmers have only $11 in debts for every $100 of assets, compared with $19 of debts in 1940. No wonder the market value of farmland is going up. USDA's Agricultural Marketing Service reports value of farmland per acre has gone up another 2 percent so far this year. Total U.S. farm real estate is now valued at $118.7 billion.

* * * * *

Do insects get sick? What causes the diseases? How can man

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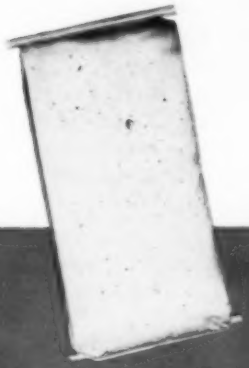

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use this knowledge to control insect populations?

Answers to these questions are expected to come from basic research now being carried on in the U. S. Department of Agriculture's 13 new Pioneering Research Laboratories.

USDA's Agricultural Research Service chief, Dr. Byron T. Shaw, recently told an audience at the National Academy of Sciences in Washington that advances are already being made by Department scientists in fields of basic research.

Among these advances is new information on how plant nutrients get from the soil into plant root cells, knowledge that is basic to a better understanding of plant growth. Progress also is being made in finding out how the clock mechanism in plants tells seeds when to germinate, flowers when to bloom, and trees when to stop making leaves and develop buds.

Over the past ten years, USDA has increased its commitment to basic research from 7 percent to 17 percent. In the Agricultural Research Service, he said, about 22 percent of research is now in the basic category, and ARS is "looking forward to the day when it will be 50 percent."

Pioneering Research Laboratories now in operation are working on such subject areas as mineral nutrition of plants, blood antigens, plant physiology, microbiological physiology, seed proteins, plant fibers, allergens of agricultural products, cellular metabolism, insect pathology, insect physiology, plant enzymes, animal genetics, and plant virology.

* * * * *

The next big pest eradication project of the U.S. Department of Agriculture will be on the African witch weed. Although now found only in 11 counties of North Carolina and 6 counties of South Carolina, witch weed poses a $1,000,000,000-a-year threat to the nation's biggest crop—corn.

Witch weed, said to have been brought in from Africa, is one of the world's most difficult pests to eradicate. Seeds germinate slowly and only in the presence of plant roots which stimulate them. Thus, seeds might lie dormant for years until a stimulating-type plant is put into the area.

Once the witch weed starts to grow, it attaches itself to roots of susceptible plants and saps the plants of nutrients. In effect, the witch weed strangles plants. What makes witch weed a major threat to U. S. Agriculture is that its favorite plant victim is corn.

Recognizing the danger of agriculture if witch weed ever becomes established in the great Midwest corn belt, Congress has appropriated approximately $3,000,000 to underwrite an eradication program in North and South Carolina. Where the witch weed is really thick, the weeds will be plowed under before they go to seed. Where witch weeds are less prevalent, herbicides will be used to eradicate them.

Control of witch weed, obviously has importance that extends way beyond the welfare of corn farmers. Livestock men, cereal makers, canners, corn products industries, and millions of consumers have a real stake in the success of this eradication program.

* * * * *

Procedures to be used in taking the 1959 census of agriculture will be tested out in the field this month. Three types of questionnaires will be used to gain information in southern, northern, and western farms.

Questions to be asked include ones designed to find out just how big farm operations are becoming, the dollar investment farmers have in farm equipment, the increased use of water for irrigation, and the amount of fertilizers used.

Not included in the questionnaires are any questions about the use of pesticide chemicals. Questions on this subject have long been an objective of NAC. Census has turned down requests for adding a question on pesticide use on the basis that pesticide use represents so small a dollar volume in farm operations that it does not rate a separate section. Thus, pesticide use information is lost in the miscellaneous category.

Despite this one big gap in farm census information, results of the census to be taken in 1959 will provide the agricultural chemicals industry with a wealth of new information on which to base future marketing plans. The 1959 farm tabulation will be carried out separately from the census of population and housing scheduled for April 1960. This will be the 17th census of agriculture since 1840.

* * * * *

Watch out for a new and broader attack by some wildlife conservation groups against the Pesticide Industry in coming months. The conservationists' complaint is not against the proper use of pesticides but against what they believe is the Industry's intention to push sales despite dangers to wildlife.

A recent article in a conservation news letter charged that chemical manufacturers are "shooting at a pesticide-herbicide goal of $1 billion by 1975—and apparently will utilize every possible approach to attain it despite dangers to wildlife and other assets."

The use of the word "apparently" indicates that the writer is making his own guess at the intentions of the Pesticide Industry. Obviously, he has guessed wrong. This wrong guess actually points up a major problem looming ahead for pesticide chemical manufacturers.

Some wildlife conservationists, at least, are confusing present efforts of the Industry to inform the public about the proper use of pesticides with a sales campaign designed to sell products "despite dangers to wildlife and other assets."

Misconceptions of this magnitude can herald the start of a new campaign against pesticides unless

(Continued on Page 119)

Arcadian® News

Volume 3 | For Manufacturers of Mixed Fertilizers | Number 11

MAKING SEMI-GRANULAR FERTILIZERS WITH STANDARD ROTARY EQUIPMENT

The growing demand for higher analysis fertilizer grades has stimulated interest in the use of sulfuric acid to make these higher grades. Although sulfuric acid is not essential for such formulations, it has been found that its use often increases agglomeration of finer particles to yield a fertilizer of superior appearance and condition. To take full advantage of this, experience has shown that a special type of ammoniating solution—such as Nitrogen Division's NITRANA® 3MC—is required.

Special Technique Required

Probably the most important factor in producing semi-granular fertilizers is the uniform distribution of sulfuric acid and ammoniating solution into the dry ingredients. The higher the analysis, the less latitude is permissible to get good results—just as in ammoniation alone. And, since sulfuric acid is introduced *before* the ammoniating solution in the semi-granulation process, any error in handling this liquid makes proper introduction of the other liquid far more difficult! In simple ammoniation, the careless operator gets no more than a powerful whiff of free ammonia. But in semi-granulation, the careless operator can cause a variety of additional hazards, such as dense white fumes, dense brown fumes, and flashes of fire which usually appear as sudden violent puffs!

Oxides of nitrogen produced in flash fires and contained in brownish fumes present a serious safety problem, in addition to causing analysis difficulty in the final product. Accordingly, the breakdown of ammonium nitrate by sulfuric acid *must* be minimized. Therefore, good spray pipes must be used, and these usually require considerable custom fitting right on the job because of differences and limitations of the equipment available. The orifices in the pipes must be kept as small as possible to control the speed of introduction of liquids by these orifices instead of relying on line valves. Throttling of a line valve often causes poor distribution due to lack of pressure at the spray pipe orifices.

Technical Tips for Better Ammoniation

Points to Remember

For the best possible results in semi-granulation, the producer would do well to check his equipment and procedure against these eight important points:

1. Spray pipes should be as simple as possible and easily removable to minimize maintenance costs. Stainless steel is preferable for solutions, while extra heavy black iron is suitable for acid.

2. Dry superphosphate and a low water, high ammonia and ammonium nitrate content solution, such as NITRANA 3MC, are necessary.

3. All dry materials should be screened to remove large lumps, as in good pulverized fertilizer practice.

4. 66°Be′ sulfuric acid (93.19%) seems to be best in most cases. With very dry superphosphate, 60°Be′ (77.67%) may be used. 98% sulfuric acid is probably a little more difficult to distribute safely in the mixer without causing fumes; and it also has a freezing point that is a bit too high for use in cold locations.

5. Use of uniform coarse filler or granulated potash will help reduce fines in the finished product. Obviously, the less very fine material, the less agglomeration necessary.

6. Cooling of the semi-granulated material is always necessary, whether by rehandling or by rotary cooling.

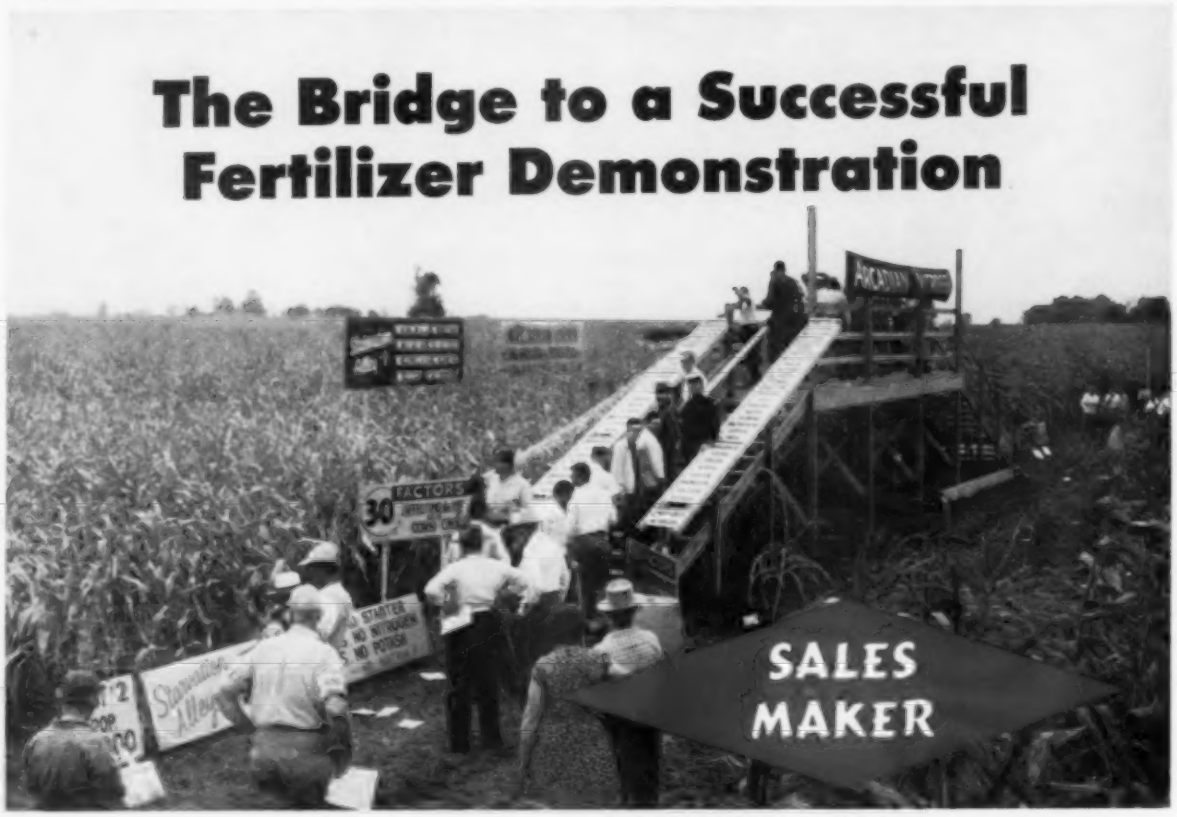
7. The usual starting practice is to charge all dry materials, introduce all sulfuric acid, and then introduce solution. Time of rotation before discharge may vary. Most grades may be discharged immediately after ammoniation.

8. Reversion of P_2O_5 has not been a problem even at fairly high manufacturing temperatures—250°F.—because material is of low moisture content and is cooled within 24 hours.

For more specific information on any of these factors or any problem related to making semi-granular fertilizer, write to Technical Service, Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N.Y. Phone: HAnover 2-7300.

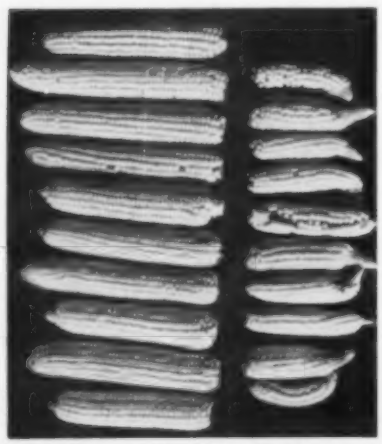
Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

The Bridge to a Successful Fertilizer Demonstration



One of the best ways to sell fertilizer is to develop a carefully-planned field demonstration to show the big profit that can be made from fertilizer—and get thousands of farmers to come and see it.

Such a demonstration was sponsored by Nitrogen Division, Allied Chemical, at The Prairie Farmer Farm Progress Show, September 24 and 25, which was attended by more than 215,000 farm people.



WITH and WITHOUT fertilizer.

The aim of the demonstration was to show a striking comparison between well-fertilized corn and corn with no fertilizer. Three one-acre plots received a well-balanced, high-nitrogen, complete fertilizer program. Two one-acre check plots received no fertilizer, and these were real "starvation alleys."

An important feature of the demonstration was an observation bridge constructed so that farmers could get a good view of the corn plots at pre-harvest stage. Thousands of farmers and their families crossed the bridge, studied the plots, and visited the Nitrogen Division tent to get more facts about proper fertilization.

Careful Planning and Preparation

Work on the demonstration started nine months before the Show. The field was typical farm land, not too fertile. It had been in unfertilized pasture for two years. Soil tests showed that the soil needed lime and that it contained about 75 pounds of nitrogen, 65 pounds of phosphorus and 100 pounds of potash per acre.

The soil was limed and a complete fertilizer program was prepared and followed. This included plow down of the equivalent of 1,500 pounds of 10-10-10 fertilizer per acre, followed by 130 pounds of 12-12-12 starter fertilizer and a top-dressing of 50 pounds of nitrogen.

Corn was planted on May 4, using 20,000 kernels per acre. Starter fertilizer was applied to one side and below the seed. An insecticide was applied to control soil insects. The corn was cultivated only once—enough to control weeds.

Difference was Easy to See

The season was wet and cold with little sunshine. But the fertilized plots came through in fine shape. The "starvation alleys" without fertilizer lived up to their poor prospects. The contrast was wonderful! You could see the difference a quarter mile away. All plots were big and wide so that the check plots got little help from the fertilized plots.

Each plot was marked with an easy-to-read sign, placed low along the ground or high above the tassels so that it would not interfere with the view, and be easy to photograph with the crop. The observation bridge was really a

30-foot platform with 25-foot approaches at each end. Going up the steps and across the bridge, the crowd had time and opportunity to get an excellent view of the entire area of all the plots. Before their eyes was a striking picture of the difference fertilizer makes in the growth and yield of a corn crop.

Along the railings of the stairs leading to the platform were lists of 30 factors affecting the yield of corn, starting with nitrogen, phosphorus and potash and continuing through other factors all the way to harvesting.

Big Profit from Fertilizer

Yields from 1/100 acre had been harvested from each plot and placed in a basket in front of the plot. Visitors were invited to guess the yield of each plot and turn in their estimates to compete for prizes. This helped to stimulate more interest and make the viewers examine the plots carefully.

There was a big difference in yields and profits between the fertilized and the unfertilized plots. Fertilizer produced 151 bushels per acre, as compared to 44 bushels with no fertilizer—an increase of 107 bushels for fertilizer.

Moisture was 10% lower in the fertilized corn and protein content was 2¾ to 3½% higher. Assuming that 60% of the fertilizer was used by this year's crop, and figuring corn at $1 per bushel, the fertilizer paid a big profit.

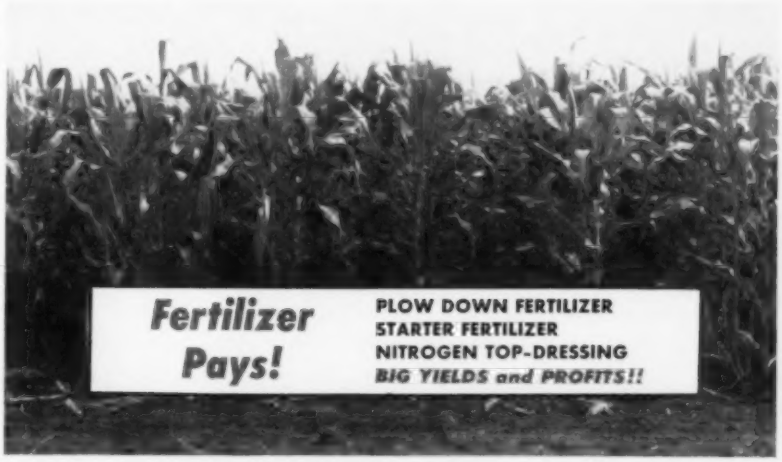
Farmers Were Convinced

There was every indication that the demonstration was a huge success. Many favorable comments were heard—"If this demonstration doesn't convince farmers to use fertilizer, nothing else can". . ."You have told the story with the corn plots, the signs, the approaches and the bridge better than if a book had been written on the subject". . ."This is the best fertilizer demonstration I have ever seen anywhere!"

Lessons learned from this demonstration: allow yourself plenty of time . . . make all your plans and preparations well in advance . . . make sure you get a striking difference in growth and yield . . . test the soil and give it what it needs . . . use big plots . . . use plenty of the right fertilizer and plenty of good seed for thick spacing . . . put up easy-to-see, easy-to-read signs . . . arrange a field day just before the crop matures when corn is at its best . . . attract thousands of farmers and provide them with a good vantage point from which to view the whole field so they can see the profits from fertilizer.

Nitrogen Division exhibit tent at demonstration.

"Starvation Alley" where no fertilizer was used.



Farmers saw a big difference on fertilized plots.

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When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6	42.0	19.5	66.3	6.0	8.2	9.3	1.178	10	34
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

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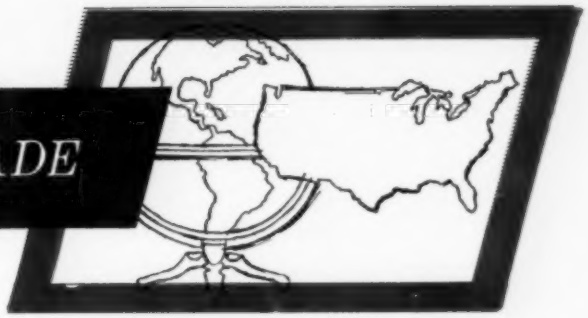
NEWS about the TRADE



Illinois Applicator's School

The Illinois Custom Spray Operators' Training School of 1959 will be held January 28-29 at the University of Illinois, Urbana, Ill. Program details will be announced in December.

•

Bunker Plans Fertilizer Plant

Bunker Hill Company announced its intention to construct a $10 million fertilizer plant in the Northwest scheduled to go into production by July, 1960. The plant will have an annual capacity of 200,000 tons of fertilizer products.

The fertilizer will be manufactured from Bunker Hill's own sulfuric acid, which is a by-product of the company's lead and zinc reduction plants at Kellogg, Idaho. Present acid production is 100,000 tons a year.

•

C-VPFA Announces Program

The 1958 meeting of the Carolinas-Virginia Pesticide Formulators Assn., Nov. 18 to 20, at the Carolina Hotel, Pinehurst, N. C., will include several discussions on new developments in the pesticide industry.

Trends in nematode control will be discussed by Dr. C. J. Nusbaum, N. C. State College, Raleigh; and Dr. S. H. Benedict will give an address entitled, "Nematodes, Confidence Men of the Soil."

Manager of the plant products development department of Merck, J. M. Merritt will give a round-up of "Gibberellins in Action" at the meeting. He is expected to review past developments produced by "Gibrel" and list prospects for the future.

S. H. Hall, director of the pesticide chemicals research laboratories, USDA, Beltsville, Md., will outline the changing insecticide picture. Also among the speakers will be Parke C. Brinkley, commissioner of the Virginia Department of Agriculture and Immigration, and L. H. Fountain, North Carolina House of Representatives.

•

To Distribute For Fisons

Fisons Pest Control Ltd., London, has reached an agreement with the Murphy Chemical Co. Ltd., Wheathampstead, Herts, England, whereby Murphy will be responsible for the distribution of all of Fisons' crop protection chemicals suitable for use on horticultural crops and on hops, throughout the United Kingdom.

Earlier this year, Fisons Pest Control announced a link with the Geigy Co. Ltd., under which they now market all agricultural chemicals, except DDT, produced by Geigy.

•

Monsanto Research Laboratory

A new agricultural research laboratory of the Monsanto Chemical Co. is now in operation at the company's headquarters site in suburban St. Louis, Mo. The facility provides more than 25,000 square feet of floor space for Monsanto's research staff.

Included in the two-story structure are laboratories, offices, conference rooms, a research library, and eight adjoining greenhouses.

PCA Elects Hall VP

At a recent meeting of shareholders of P. C. A. Limited, John W. Hall was elected a vice president and a director of P. C. A. Limited. Mr. Hall will also continue as the vice president of sales, a member of the board of directors, and a member of the executive committee of the parent company, Potash Company of America.

John W. Hall

•

Spencer Changes in SE

Two changes in its Southeast District Agricultural Sales organization have been announced by Spencer Chemical Company. Kirk Sanders, formerly manager of the Southeast District which has its headquarters in Atlanta, has been put in charge of special projects for the district. Tom Campbell, formerly North Carolina sales representative for Spencer, will become Southeast district manager.

•

Settle Patent Suit

Stauffer Chemical Company and Chemical Insecticide Corporation announced last month the settlement of the infringement suit against the latter involving Stauffer's U. S. Patent #2,766,554. This patent covers the new soil fumigant developed by Stauffer's Research Department, sold under the Stauffer tradename Vapam®. Under the terms of settlement, Chemical Insecticide has acknowledged the validity of the Stauffer patent and is now subject to a permanent injunction which will prohibit it from any further infringement of this patent.

ESA To Meet In Utah

The Entomological Society of America will hold its annual meeting Dec. 1 to 4 at the Hotel Utah

Robert Metcalf

in Salt Lake City. Over 300 papers, covering all aspects of entomology, numerous symposia, and other speakers make up the four-day program.

Dr. Robert L. Metcalf, chairman, Department of Entomology at the University of California Citrus Experiment Station, Riverside, is president of the society. In a recent message to the society, Dr. Metcalf said that entomology concerns itself with two-thirds of all living organisms. Dr. Metcalf, a consultant to the World Health Organization, pointed out in his message that entomologists are playing a key role in the fight against malaria.

•

ICI Visitor from India

The first Indian chemical engineer to visit the U.S. under the technical assistance program of the International Cooperation Administration arrived in New York recently for an extensive six months study tour of American fertilizer plants. N. V. Gopinath, superintendent of the chemical control division of The Fertilizers & Chemicals (Travancore), Ltd., is shown here being welcomed by Frank G. Breyer of Singmaster & Breyer, New York, who designed the Fertilizers & Chemicals plant which has been in production since 1946. India's most pressing problem, says Mr. Gopinath, is still food. To raise more food, India must build more fertilizer plants. Present fertilizer capacity of the country is only about 450,000 tons a year, but this will be doubled under a five-year plan now being undertaken. New plants will be built to produce urea and ammonia.

•

Brazil Invites Bids

Bids have been invited by the Director of the Department of Public Welfare, City of Recife, Pernambuco, Brazil, for industrialization of the city's trash materials, principally garbage.

The offer requires the U. S. bidder to provide private capital investment for the purchase of a factory site, and necessary machinery and equipment for establishment and operation of a plant to convert 300 tons of garbage daily into fertilizer, using biological processes.

•

Fertilizer Group Meeting

The National Fertilizer Solutions Association is holding its 1958 convention Nov. 16 to 18 at the Netherland Hilton Hotel, Cincinnati, Ohio.

A panel on the subject, "Planning for Profits" will be moderated by E. E. Crouse. Members of the panel and their subjects will be: Robert Weber, Monsanto Chemical Co., Production & Inventory Control; William W. Arnold, Allied Chemical Corp., Production Equipment; and Donald R. Weber, Spraying Systems, Inc., Standardization.

Dr. Samuel N. Stevens, a management consultant, will speak on the challenge to business of a changing economic society.

Professor George M. Beale and Professor Joseph Bohlen of Iowa State University also will be at the meeting and will tell how farm people accept new ideas and problems.

•

Stauffer Earnings Up

The Stauffer Chemical Co., New York, last month reported that net earnings for the three months ended Sept. 30, 1958, were $4,349,000 or $1.22 per share, which includes 16 cents per share of non-recurrent income. For the same period in 1957, net earnings were $3,326,000 or $.94 per share.

Riemer Joins U. S. Borax as VP

United States Borax & Chemical Corporation, Los Angeles, Calif. announced late last month,

Hugo Riemer

the appointment of Mr. Hugo Riemer to the recently created position of executive vice president of the company. Mr. Riemer was also elected to the board of directors of the company, as was Mr. Norman Travis of London, England.

Mr. Riemer will take up his new duties immediately. He is well known in chemical and fertilizer circles in the USA having been with the Allied Chemical Corporation for over twenty years. His last position with that company was as president of its Nitrogen Division.

Currently a director of Borax (Holdings) Limited, Mr. Travis succeeds Mr. D. Abel Smith who has resigned from the board of directors of United States Borax & Chemical Corporation for personal reasons.

•

Moffitt Succeeds Murray

Thomas E. Moffitt, president of the Hooker Chemical Corp., Niagara Falls, N. Y., has been named chief executive officer of the company, succeeding R. Lindley Murray, chairman of the board.

Mr. Murray will continue as chairman, a position he has held since 1951, and plans to remain in active service until Dec. 1, 1959.

•

Cereal Rust Conference

A conference on the Chemical Control of the Cereal Rusts will be held January 26-27 at the Institute of Agriculture, University of Minnesota, St. Paul, Minn. Further information on the conference may be obtained from the department of plant pathology and botany.

THE NEW HUDSON HANDLE BAG

OPENS NEW MARKETS . . . AWAKENS OLD ONES!

ANOTHER FIRST FROM HUDSON is the perfected—fully tested heavy duty handle for a multiwall bag containing 50 or more pounds.

The Easy Carry—Easy Pour* features of the Hudson Handle Bag make it the ideal package for both consumer and industrial products. It brings unlimited possibilities for self-service and grocery supermarket outlets of products in the 50 lb. package. Customer in-store pick-up by men and women is certain because of the effortless carrying without soiling clothing.

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The NEW Hudson Handle Bag can fire up your sales and get you ***new distribution, dealer promotion*** **and** ***customer preference,*** and the difference in cost is negligible.

EASY CARRY — EASY POUR** . . . All the Hudson EXTRAS are naturals with the Handle Bag. ***Snap-Open bag — so easy a ten year old can open a bag with ease. ***Design Service*** — horizontal design assistance for greater impact and readability is offered free. Plus: ***Non-Slip Ink, Magnetized, Foil Wall, Ply-Weld, Seal-O-Matic Sleeve, Cold Proof AL, M. V. T. Seal, Fast Delivery, Written Guarantee.***

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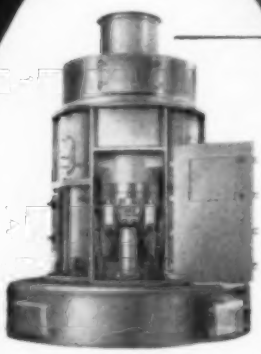
Then you're looking for a Bradley Pneumatic Hercules Mill. Because the Bradley Pneumatic Mill is installed on a foundation flush with the floor line, it not only reduces foundation costs but simplifies inspection and maintenance. Grinding parts are also easily accessible . . . both grinding die ring and roll assemblies can be removed without dismantling the mill. And the mill's durable, nonclogging vibratory feeder and electrical control eliminate manual feeding . . . allow continuous operation of the mill. Add rugged construction to this, and you have a mill which produces a uniform grind from 20 to 325 mesh with an absolute minimum of replacements and downtime.



BRADLEY PNEUMATIC HERCULES MILLS

See Chemical Engineering Catalog or for complete information, write for Catalog No. 63

BRADLEY PULVERIZER CO.
superior grinding equipment since 1891

LONDON ALLENTOWN, PA. BOSTON

Joseph L. Sturtevant Dies

Joseph L. Sturtevant of Squantum, Mass., 84, treasurer and former president and chairman of the Board of Sturtevant Mill Company, Dorchester, Mass. and former owner of Thayer Drug Co., Cambridge, Mass., died on October 16, 1958, at Massachusetts Memorial Hospital, Boston, after a long illness.

Mr. Sturtevant was a graduate of the Class of 1894 of Massachusetts Institute of Technology. His early life was spent in Framingham, Mass., prior to moving to Quincy, Mass. with his father, Thomas Leggett Sturtevant, and mother, Laura Emerson Heaton Sturtevant.

He leaves his wife Louise (Marston) Sturtevant, a niece, Mrs. Louisa S. English, and a grandnephew, W. S. English, both of Quincy, Mass.

•

To Head Chicago District

The Multiwall Bag Division of the West Virginia Pulp and Paper Co., New York, has named John O. Frahm district sales manager of the Chicago area. Mr. Frahm formerly was a sales representative for the division, working out of Kansas City.

The new district sales manager's headquarters are in Chicago and the area he will cover includes the metropolitan area of Chicago, most of northern Illinois, and the Milwaukee area of Wisconsin.

•

Grace Sales Managers

Joseph W. Floyd has been named Memphis District Sales Manager for the Grace Chemical Division of W. R. Grace & Co., New York. He replaces C. J. Brown who has resigned.

Lee J. Slusher has replaced Mr. Floyd as Southeastern District Sales Manager with headquarters in Tampa, Fla. Mr. Slusher had been assigned to the division's home office in Memphis.

Mr. Floyd joined Grace in 1954 and was appointed Southeastern District Sales Manager in 1955.

Hercules Urea Plant Now In Commercial Production

New urea-producing facilities at Hercules Powder Company's plant in Hercules, California, are now in commercial production, with a capacity of 20,000 tons a year. Principal end use for the urea will be in "UN-32" high-nitrogen-yield liquid fertilizer. Seventy-five per cent of the new plant's production will be for agricultural use, and the remaining 25 per cent will be used largely in the manufacture of urea formaldehyde resins, and the plywood and particle board industry. A feed-grade urea will also be available for cattle feeds.

•

Calspray Appoints

Several new district managers have been appointed in California Spray Chemical Corporation offices. Edwin B. Acree, Jr., has been named district manager of the S.E. Atlantic area. Gerald H. Johnson was named district manager of the Mississippi Delta area;—and Francis X. Vaughan was named assistant to E. W. Cannon, vice president and manager, marketing department.

•

Additional Diazinon Uses

Approval has recently been granted for use of Diazinon on several additional crops: snap beans, cucumbers, onions, figs and hops. Geigy Agricultural Chemicals, New York manufacturer of Diazinon, announced that onion growers will be interested in use of Diazinon to control onion maggots.

•

F & C Process Sale to Krebs

Fertilizers & Chemicals Ltd., Haifa, Israel, has contracted for the sale of its "know-how" for the production of dicalcium phosphate to Krebs & Co. of Paris, France, who are erecting a DCP plant in Belgium. Some of the equipment for the plant will be erected by F. & C. and supplied to Belgium. The F. & C. process is based upon the original work of the late Dr. H. Auerbach.

Keilen Joins Rubber Company

Dr. John J. Keilen Jr. has joined the Charleston Rubber Company, Charleston, S. C., as director of research and development. Dr. Keilen had been director of development for the polychemicals division of the West Virginia Pulp and Paper Co. in Charleston.

Charleston Rubber Co. is a leading manufacturer of rubber protective gloves, sleeves, and other equipment for use in the chemical field and general industry.

•

N. J. Entomological Club

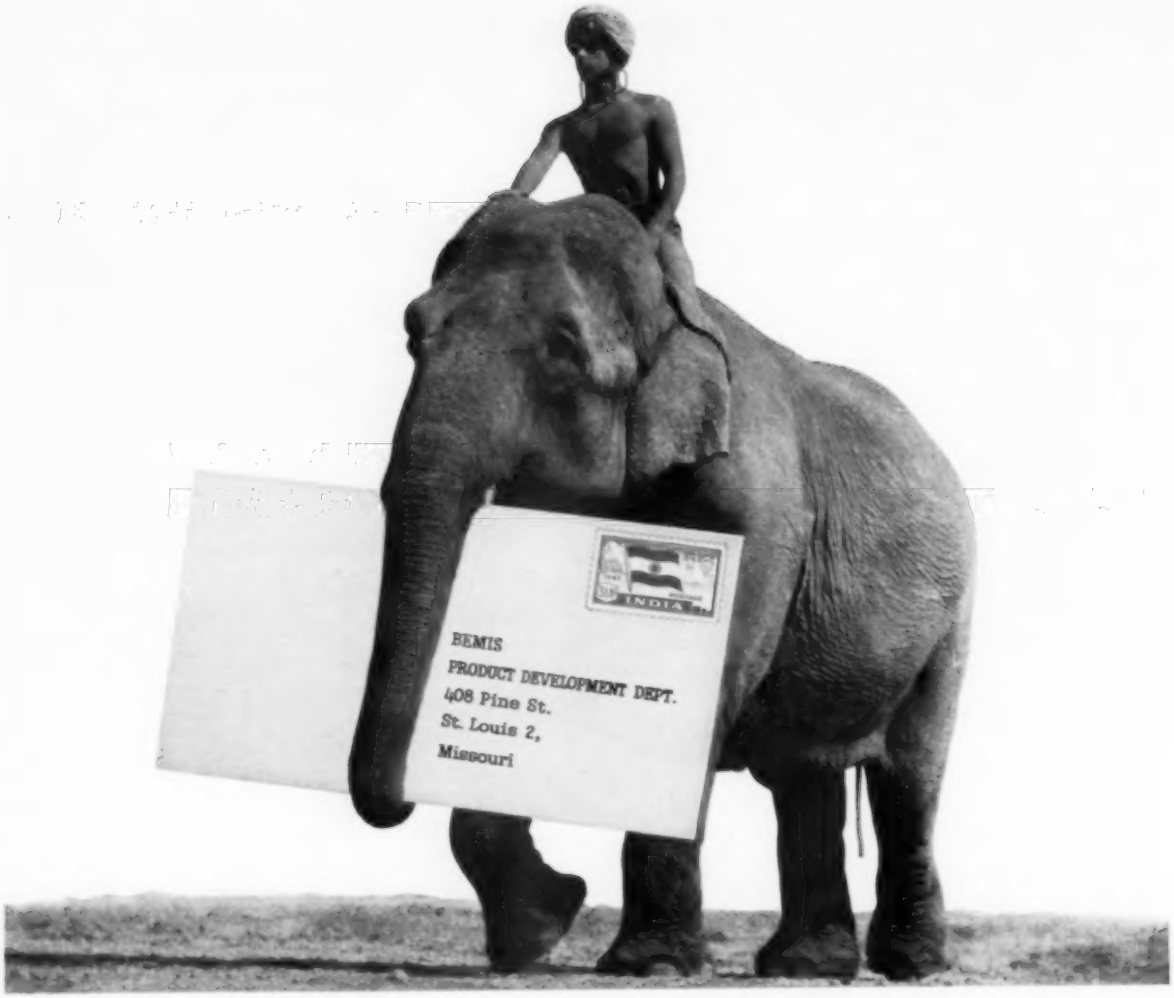
The New Jersey Entomological Club will hold its annual meeting November 20th, at 7 P.M. at the Edgebrook Diner, New Brunswick, N. J. This meeting will follow the all-day conference of New Jersey Pesticide Dealers at Rutgers University.

•

New Escambia Research Lab

Escambia Chemical Corporation dedicated its new research laboratory at Wilton, Connecticut on October 17.

Escambia, which has its executive offices in New York City, and plant facilities in Pensacola, Fla., last year purchased a 45-acre site in Wilton, Conn. It recently completed the 2-story brick and steel structure with some 50,000 square feet of research space. The Wilton facility will be used exclusively for research in chemicals, including pharmaceutical intermediates, materials for the plastics industry and synthetic organic chemicals.



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12-WEEK TORTURE TEST!
Bemis Acid-Resistant Thread was buried 12 weeks in triple superphosphate, along with a widely used synthetic filament thread and two other leading competing brands. Bemis scored the same as the filament thread yet costs *less than half* as much! The other two brands scored far down in strength and, consequently, value.
For the *complete* story, write to the address shown above.

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Bemis may already be making the better package you need. Call, write, or ask your Bemis man.

Plan Smith-Douglass Merger

The possibility of a merger of the Smith-Douglass Co., Norfolk, Va., and Wilson and Toomer Co., Jacksonville, Fla., was revealed last month by Smith-Douglass. At that time, stockholders of the two fertilizer manufacturers had come to no decision in the matter.

Smith-Douglass operates 11 plants in ten cities and Wilson & Toomer has six plants in Florida and Georgia. Smith-Douglass' last expansion was the acquisition of Texas City Chemicals Inc., in the fall of 1957. Earlier it acquired the Coronet Phosphate Co. which has large land holdings in Florida and the San Jacinto Chemical Co. of Houston, Texas. Other plants are located in Virginia, North Carolina, Illinois, and Minnesota.

•

Controls Black Spot, Mildew

The California Spray-Chemical Corp., Richmond, Calif., is marketing Phaltan, a new fungicide discovered by Standard Oil of New Jersey, under the label of Ortho Rose Garden Fungicide.

The Calspray product, which contains 75 per cent Phaltan, has reportedly proven effective in field tests against both rose black spot and mildew. It can be used, it is stated, in combination with most common insecticides.

In certain of its properties, Phalthan resembles captan but it is more effective in its ability to control diseases of vegetables. It was discovered in 1947, but has been in active research since only 1951. Although marketed only in the East at present, Ortho Rose Garden Fungicide is being tested for the West and should be available in that market soon.

•

Fertilizer Plant In Brazil

Plans are being completed for the construction of a nitrogenous fertilizer plant in Brazil utilizing joint Japanese-Brazilian capital and facilities.

The plant will be constructed at Aratuhipe in Bahia Province. Under current proposals, Japan will supply 45 per cent of the capital in the form of machinery to be installed at the plant. The new factory, utilizing natural gas, will manufacture 20 tons of ammonia, 180 tons of lime, 150 tons of nitric acid, and 150 tons of urea daily.

•

Hercules Producing Urea

Commercial production of urea by the Hercules Powder Co. at its new plant at Hercules, Calif., was started last month. The plant has a capacity of 20,000 tons per year.

Seventy-five per cent of the new plant's production will be for agricultural use. Principal end use for the urea will be in UN-32, a long-lasting, high-nitrogen-yield liquid fertilizer containing 35 per cent urea and 45 per cent ammonium nitrate. Because of its purity, UN-32 also can be used for foliar applications. It has no pressure, no volatile ammonia, and contains 32 per cent nitrogen. UN-32 also is compatible with weed killers such as 2,4-D, and accelerates decomposition of crop residues and compost, according to Hercules.

•

Clayton Joins CSC

The Commercial Solvents Corp., New York, has named Frank B. Clayton to its agricultural chemicals sales staff. He is assigned to the company's Kansas City district office, Kansas City, Mo.

•

Michigan Strike Ends

A 17-day strike against the Michigan Chemical Corp.'s plants in Saint Louis and Manistee, Mich., was ended early last month by the acceptance by Local No. 11-224 of the Oil, Chemical, and Atomic Workers International Union (OCAW-CIO) of the company's terms covering a new three year contract.

Terms of the settlement include a five cent an hour increase for each of the three years of the contract, a new five-day sick-leave plan, and a contributory pension plan beginning with the third year of the new contract.

Ainsworth Moves To Geigy

S. E. Ainsworth has been named sales representative for the states of Illinois and Iowa by Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Ardsley, N. Y. He is located in Chicago.

Formerly employed in the New York office of the Dow Chemical Co., Mr. Ainsworth had been responsible for the promotion of farm and industrial herbicides, fumigants, and other pesticides.

•

Fertilizer Trends Traced

During the past 5 years, the fertilizer industry has seen a period of rapid change—a period of vast expansion of the old established companies and the entry of many new companies, according to *Fertilizer Trends*, a booklet published last month by the Tennessee Valley Authority, Knoxville, Tenn.

The booklet is a revision of an earlier publication and traces statistically some of the principal trends in the industry. Since World War II, it reports, fertilizer consumption in the U.S. has more than doubled—from 2.6 million tons of plant nutrients in 1945 to an estimated 6.4 million tons in 1958. Trends in population growth and total fertilizer consumption over the past 25 years would suggest a national market in the early 1970's exceeding 10 million tons of plant nutrients.

The booklet lists producers of various materials and total production figures including elemental phosphorus, superphosphate, concentrated superposphate, and ammonium nitrate.

•

Brack B. McHan Dies

Brack B. McHan, vice president and director of research for the Calcium Carbonate Co., Quincy, Ill., died last month. He was 73 years old.

Mr. McHan was widely known in feed and chemical fields. Under his direction, the wet process for adding iodine to calcium carbonate was developed.

Marking out areas of the middle Atlantic states where greater technical assistance will be available to farmers and farm dealers is Robert L. McCormick, general sales manager of the I. P. Thomas division of Dixon Chemical Industries Inc., Merchantville, N. J. With him is (seated left) Fritz Anspach, manager of technical sales and service. Members of the enlarged Dixon field force are (standing, left to right) Francis Kenny, Paul Oland, William Bennett, Robert Kennel, Donald Bucks, Mike Palmer and Robert Free.

Dixon Fertilizer Service

The I. P. Thomas Division of Dixon Chemical Industries, Inc., Merchantville, N. J., is organizing a technical service department to bring farmers more field and laboratory help in fertilizer selection.

I. P. Thomas, recently acquired by Dixon from Pennsalt Chemicals Corp., Philadelphia, markets more than 50 grades of fertilizers and special mixtures in the middle Atlantic states. Dixon is a basic producer of sulfuric acid.

Fritz Anspach, a soil chemist with 19 years of advisory work experience, has been made manager of technical sales and service for the I.P.T. division. The Soil-Test Servicing Laboratory at Glassboro, N. J., has been engaged to give Dixon customers a complete soil testing service, including fertilizer recommendations.

Release New Pesticide

Experimental quantities of Dri-Die, a new type insecticide, have been released by W. R. Grace & Co. Davison Chemical Division, for evaluation by members of the National Pest Control Association and state and federal agricultural departments.

This announcement was made in a panel discussion at a Washington, D. C., meeting of the N. C. P. A., October 22nd.

The material is a treated Silica aerogel, a very fine (micron-sized) white powder derived by processing sodium silicate and sulfuric acid. It has been shown to be very effective in extensive tests on roaches and wood termites and has shown promise in limited tests on houseflies, mosquitoes, ants, fleas, ticks and other insects. It acts by attacking the essential waxy coating which protects the body moisture of insects.

Favorable reports have been made as a consequence of research at the University of California (Los Angeles), and other institutions, but the company emphasizes that Dri-Die is still in the experimental stage and none will be marketed for general use until further research is completed.

A prospective advantage of the product, in addition to its lethal qualities, is that its action is fundamentally physical. Entomologists believe accordingly that insects may not develop the tolerances experienced with organic insecticides.

Joins Michigan Sales Staff

Bogardus Werth has been appointed to the chemical sales staff of the Michigan Chemical Corp., Saint Louis, Mich. He has been with the Virginia-Carolina Chemical Corp., Richmond, Va., where he was assistant sales manager for agricultural chemicals.

•

Completes Fertilizer Unit

Planters Fertilizer & Phosphate Co. has announced that its new factory in Charleston, S. C., for the production of granular-type fertilizer has been completed. The Charleston plant will distribute throughout South Carolina and parts of North Carolina, Virginia, and Tennessee.

•

Peltz Represents Prentiss

The R. Peltz Co., Philadelphia, has been appointed exclusive sales representative for the Prentiss Drug & Chemical Co., New York, in the Philadelphia, Baltimore, and Washington area.

•

Colo. Assn. Meets Jan. 29-30

The 1959 meeting of the Colorado Agricultural Chemicals Association will be held January 29 and 30, 1959 at the Cosmopolitan Hotel in Denver, Colo. For information pertaining to the meeting, write to CACA secretary, D. E. Garrison, Box 623, Greeley, Colo.

•

Meyer Expands Offices

Wilson & Geo. Meyer & Co., San Francisco, has announced the opening of a new sales office in El Centro, Calif. At the same time, Wilson & Geo. Meyer & Co. Intermountain, an affiliate company, announced the opening of a new sales office in Twin Falls, Idaho, and enlargement of its sales staff at Salt Lake City, Utah.

Leland Oberholster, who has been handling sales in the parent firm's Los Angeles office, has been named manager of the new El Centro office. Marlowe Wood has been transferred from Meyer Intermountain's Salt Lake City office to head the Twin Falls sales office.

For uniformly conditioned mixed goods, use

Du Pont UAL-S

Here's how it works . . .

New Du Pont UAL-S permits you to take advantage of the well-known conditioning effect of sulfates in fertilizers. A small amount of ammonium sulfate added in a finely dispersed form as in UAL-S is equivalent to a much larger amount added dry to the mixture . . . ammonium sulfate means better, more uniform conditioning. All of your fertilizers will benefit from nitrogen derived from UAL-S, because it combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur . . . an essential plant nutrient with recognized agronomic value.

Regular mixtures cure well with UAL-S, are free-flowing and resist caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well. UAL-S is non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum, and it's safe—handles at moderate pressure, and there's no danger of flash fires.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, fill out and mail the coupon.

PROPERTIES OF UAL-S

Nitrogen Content	42.5%
Freezing Point	20°F.
Pressure	15 psi at 60°F.
Specific Gravity	1.13
Fixed to Free Ratio	.9 to 1.0

Composition: Parts 100

Urea	38.8
Ammonium Sulfate	10
Ammonia	27.1
Water	15.1
CO_2	9.0

Du Pont UAL solutions in mixed fertilizers have helped American farmers grow better crops for 25 years.

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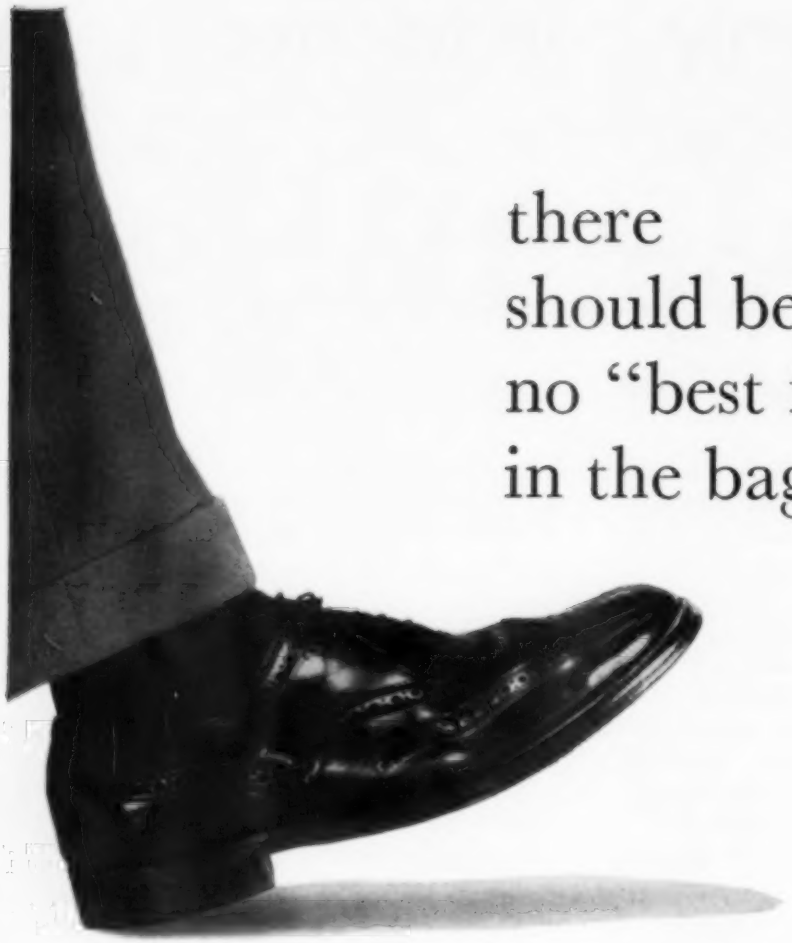

there should be no "best foot" in the bag business

Putting the best foot forward may be good selling strategy, but the smart *buyer of bags* looks farther.

He knows, for example, that new "features" can be hamstrung or stymied by lack of interest or lax follow through

... that sharp, clear printing accomplishes nothing if bags aren't delivered on schedule.

... that utmost care in skilled manufacture means little if a different bag would do the job better.

When it comes to "best feet," you could call Chase a centepede, for good bags, Chase-designed to *your* needs – *properly made, promptly shipped* – reflect the competence of hundreds of specialists who constitute the progressive Chase family.

Chase makes bags of all kinds—multi-wall paper, textile, Saxolin open-mesh, Polytex film, laminated, waterproof ... consumer-size bags and larger.

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Grace Dedicates New Chemical Research Center at Clarksville, Md.

IN a formal tour and open house, W. R. Grace & Co. opened its new industrial chemical research center at Clarksville, Md. on October 22nd. Known as the Washington Research Center, the $5 million dollar facilities, located 25 miles north of Washington, D. C., house laboratories where studies will be continued on Grace projects dealing with agricultural research, catalyst and polymer research, organic chemistry, inorganic chemistry, process development, new product development, etc.

Highlight of the tour included a display of results with Grace's new insecticide "Dri-Die," a treated silica gel, that kills insects by drying them out.

The material, is a very fine (micron-sized) white powder derived by processing from sodium silicate and sulfuric acid. It has been shown to be effective in extensive tests on roaches and wood termites and has shown promise in limited tests on houseflies, mosquitoes, ants, fleas, ticks and other insects. It acts by attacking the essential waxy coating which protects the body moisture of insects.

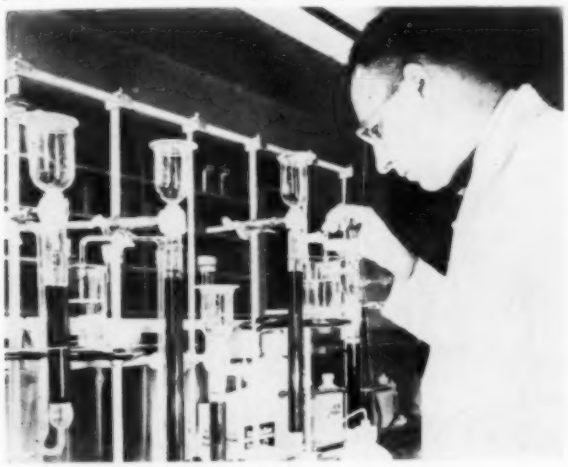
Favorable reports have been made following work at the University of California (Los Angeles), and other institutions, but Grace emphasizes that the material is still in the experimental stage and none will be marketed for general use until much further research has been completed and the proper authorization given by federal agencies.

A number of laboratories equipped with complete facilities for specialized studies are located in the new center. These include the petroleum laboratory, catalyst research laboratory (designed to do what an oil refinery does); research services laboratory which is in charge of all specialized analytical instruments located throughout the center; organic chemistry laboratory; polymer chemistry department, and the agricultural chemicals research laboratory.

The agricultural research laboratory concentrates on experimental work on new combinations of fertilizers. Plant growth tests are moved out-of-doors to experimental field plots on the farms surrounding the Washington Research Center for larger scale testing after work has been conducted on a smaller scale in the light chamber.

A miniature scale mixed fertilizer plant is located in the basement of one of the laboratories in order to simulate conditions found in commercial plants. Not only are

Dr. Frederick S. Lee works on a method for determining phosphate content of a newly developed fertilizer material.



After a candidate nematocide has been screened, it is tested in the light chamber to determine efficiency under actual growing conditions.

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From The Country's Largest And Most Dependable Source Of Phosphate Products For High Analysis Formulations

Phosphoric Acid of highest purity
to assist you in reducing
formulation cost and maintaining
consistent, uniform high quality
in all your phosphate processing.

Manufactured to the following specifications:

52-54% P_2O_5
Solids less than 1% by weight
Specific Gravity: (60°F) 1.68-1.73

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The new Center is constructed on a 150-acre plot of farmland. Two buildings now completed, offer 96,000 square feet of floor space, with provision for future expansion. The latest laboratory instruments include: an electron microscope; x-ray spectrometer, radiation laboratory . . . . which serve all phases of research in the Grace laboratories.

Grace also has research centers at Cambridge, Mass.; Clifton, N. J.; Memphis, Tenn.; and Zurich, Switzerland. The Washington Research Center will be used primarily by the Grace Chemical Group, however, its findings will be available to any of the other Grace companies.

•

To Expand Garfield Plant

A $500,000 expansion program at the Garfield, Utah, plant of Western Phosphates, Inc., is being planned, according to the Stauffer Chemical Co., parent organization of Western.

The expansion will be on production facilities for phosphate and ammonia fertilizers.

•

Managing Arizona Branch

Virgil P. Hennen has been named agricultural branch manager for the Yuma, Arizona, area by the California Spray-Chemical Corp., Richmond, Calif. He had been a Calspray sales representative in Mesa, Arizona, prior to his recent appointment.

•

Prescription Mixing Plant

Farmers Union Central Exchange, St. Paul, Minn., a supply purchasing cooperative, has started construction of a Co-op Soil Service Center at Baraboo, Wisc., to provide a "prescription mix" fertilizer service for farmers of the surrounding area.

Prescription mixing of fertilizer ingredients, based on soil sample analysis, was introduced by the co-op in June, 1957, and seven plants similar to the new Baraboo facility have been constructed. They are located at Cottonwood, Minkato, Morris, Triumph, and Willmar, Minn., and Chetek and Mondovi, Wisc.

Farmer patrons of the center have their soil samples analyzed by a testing agency and the local co-op, and the Soil Service Center helps the farmer determine the combination of plant food ingredients that best meet his needs. After blending at the center, the farmer can make arrangements with his local co-op for spreading.

•

CIL Names Plummer Mgr.

William E. Plummer has been appointed works manager of the fertilizer plant of Canadian Industries Limited at Chatham, Ontario. He succeeds Murray Smith who, after 32 years service with the company, has retired on pension.

Industry Meeting Calendar

Nov. 5-7—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

November 7-9 — Midwest School of Retail Management and Trade Show (formerly known as the Garden Supply Trade Show) Hotel Knickerbocker and Navy Pier, Chicago, Ill.

Nov. 9-10 — California Fertilizer Assn. 35th Annual Convention, Ambassador Hotel, Los Angeles.

Nov. 10-11—Agricultural Aviation Research Conf., Milwaukee, Wisc.

Nov. 11-13—20th Annual New York State Insecticide and Fungicide Conference and 11th Annual Pesticide Application Equipment Conference, Bibbins Hall, Cornell University, Ithaca, N. Y.

Nov. 11-14—Annual Meeting, National Aviation Trades Assn., Pfister Hotel, Milwaukee, Wisc.

Nov. 13-14 — Canadian Chemical Specialties Manufacturers, Queen Elizabeth Hotel, Montreal.

Nov. 16-18—National Fertilizer Solutions Assn., Netherland Hilton Hotel, Cincinnati, Ohio.

Nov. 19-20—Annual Meeting, Carolinas-Virginia Pesticide Formulators Assn., Carolina Hotel, Pinehurst, N. C.

Nov. 20—New Jersey Pesticide Dealers Conf., Rutgers Univ., New Brunswick, N. J.

Nov. 20-21—Commercial Chemical Development Assn., joint meeting with representatives of the NACA, Lord Baltimore Hotel, Baltimore, and Beltsville, Md.

Nov. 24-25—Eastern Branch, Entomological Society of America, Lord Baltimore Hotel, Baltimore.

Dec. 1-4—Entomological Society of America, Sixth Annual Meeting, Hotel Utah, Salt Lake City, Utah.

Dec. 3-4—North Central Weed Control Conference, Netherland Hilton Hotel, Cincinnati.

Dec. 3-5 — Agricultural Ammonia Institute, Annual Meeting, Morrison Hotel, Chicago.

Dec. 9-11—Chemical Specialties Manufacturers Assn., Annual Meeting, Commodore Hotel, New York.

Dec. 17-18 — Beltwide Cotton Production Conf., Rice Hotel, Houston, Texas.

Dec. 26-30—American Association for the Advancement of Science, 125th Annual Meeting, Washington, D. C.

January 7-8—Fertilizer Short Course at Iowa State College, Sponsored by Iowa Extension Service, Ames, Iowa.

Jan. 7-9 — Northeast Weed Control Conference, Hotel New Yorker, New York.

January 12-13 — Ohio Pesticide Institute, Annual winter meeting, Neil House, Columbus, Ohio.

Jan. 21-22—Northwest Agricultural Chemicals Industry Conference, Benson Hotel, Portland, Ore.

Jan. 20-22, 1959 — California Weed Conference, Santa Barbara, Cal.

January 25-30 — Purdue Pest Control Conference, Purdue University, Agricultural Hall, Lafayette, Indiana.

January 28-29 — Illinois Custom Spray Operators' Training School, University of Illinois, Urbana, Ill.

January 29-30 — Colorado Agricultural Chemicals Association, Cosmopolitan Hotel, Denver, Colo.

January 30-February 1 — Eastern School of Retail Management and Trade Show (formerly the Garden Supply Trade Show), Hotel Statler, New York City.

Feb. 10-12 — Texas Agricultural Chemicals Conference, Texas Tech College, Lubbock, Tex.

Large Assortment of New Pesticides Displayed at National Hardware Show

THE largest and most varied assortment of lawn, garden, and light farm equipment ever assembled was a highlight of the 1958 National Hardware Show held at the Coliseum in New York, Sept. 29 through Oct. 3. The Lawn, Garden & Outdoor Living Division of the show filled two whole floors of the Coliseum with more than 700 exhibitor's booths.

A dust spray garden gun displayed by the National Carbon Co., a division of the Union Carbide Corp., New York, features a new concept of garden spraying and dusting. The propellent is contained in a replaceable aerosol can separate from the container of liquid or dust. One "Eveready" pressure-pack will last for one season under normal use. The company also exhibited its Eveready line of garden chemicals.

The California Spray-Chemical Corp., Richmond, Calif., was on hand to demonstrate the Ortho insecticides, fungicides, herbicides, and repellents. New products shown by Calspray include a borer spray, Ortho rose and garden fungicide, and Ortho-Klor 72 chlordane spray.

The chlordane 100 per cent sales support dealer program of the Velsicol Chemical Corp., Chicago, was outlined in the Velsicol booth. The program is a free service designed for lawn and garden supply dealers. It provides sales clerk training, store promotion, sales incentive awards, and a monthly insect control information service.

A new Sprayrite line of aerosol garden chemicals was demonstrated by Sprayrite Division of the Virginia Smelting Co., West Norfolk, Va. Included in the new line are malathion, diethyl toluamide, gibberellic acid, and duraset. Also being made available by Sprayrite are an animal repellent and a plant polish aerosol. The containers are brightly-colored and illustrated with the pest or plant for which they are intended.

The Zonolite Co., Chicago, showed its vermiculite lawn and soil conditioners which are offered under the trade names Terra-Lite and Terra-Lawn.

Amchem Products, Inc., formerly the American Chemical Paint Co., Ambler, Pa., was on hand to show its Weedone line of herbicides. Among the selective herbicides displayed were chickweed killer, poison ivy killer, crab grass killer, and clover killer. Amchem also offers a gibberellic acid spray and a rose and floral squeeze duster.

The garden and home agricultural chemicals offered by Faesy & Besthoff, Inc., New York, are available in standard sizes as well as the five and ten pound containers. Liquids come in pint, quart, and five-gallon containers.

The Nott Manufacturing Co., Mount Vernon, N. Y., has come out with an aerosol container for its Plant-Shoot gibberellic acid formulation.

Fertidyne, a growth stimulator, is being offered for the first time in soluble fertilizers by Comar Industries, Inc., New York. The Comar 22-22-12, all-purpose plant food and the Comar Lawn Booster have been augmented with fertidyne.

Four new du Pont products were shown at the exhibition. They are du Pont Chickweed Killer, du Pont Crabgrass Killer, du Pont Manzate, and du Pont Combination Garden Spray. In addition, du Pont displayed its entire line of garden products which includes more than 30 items.

Among other firms which displayed products of interest to home gardeners are the Garden Division of Boyle-Midway Inc., New York, that displayed its Antrol garden products, and the Miller Chemical & Fertilizer Corp., Baltimore, exhibiting its soluble fertilizers. B. G. Pratt Co., Paterson, N. J., presented a complete line of sprays and dusts as did Acme Quality Paints, Inc., Detroit. The Acme line is unusual in that none of the products are offered in aerosol containers.

The Niagara Chemical Division of the Food Machinery and Chemical Corp., Wyoming, Ill., displayed its new garden weed killer Swep. Swep controls annual grasses and many broad leaf weeds. It can be used on flower beds and in vegetable gardens.

Lebanon Chemical Corp., Lebanon, Pa., displayed its lawn and garden line of chemicals. The Stadler Fertilizer Co., Cleveland, Ohio, offered four packaged fertilizers for lawns. A complete line of plant supplies also was demonstrated by

what's your E.Q.*?

QUESTIONS

	True	False
1. Inorganic salts are frequently added to oil-water systems to break emulsions.	☐	☐
2. It is impossible to prepare practical emulsions in which the aqueous phase contains high concentrations of inorganic salts.	☐	☐
3. Good agricultural emulsifiers may be characterized as individual specific chemical compounds.	☐	☐
4. The anionic components of an agricultural emulsifier impart improved performance in soft water.	☐	☐
5. A good emulsifier can be fully characterized by the ratio of anionic to nonionic components.	☐	☐
6. The active ingredient content of an emulsifier is the chief criterion of its efficiency.	☐	☐
7. Variations in toxicant, solvent and waters require adjustments in emulsifier blend for optimum performance.	☐	☐
8. The ratio of the emulsifiers in a matched pair need not be altered when the concentrate is used at high or low dilution rates.	☐	☐
9. In general, it is safer to formulate slightly higher on the nonionic side than on the anionic side when employing matched pairs.	☐	☐
10. Most formulators use the correct amount of emulsifier in their emulsifiable concentrates.	☐	☐

*Emulsifier Quality

ANSWERS

1. True. Most emulsifiers "salt out" in the presence of inorganic salts which impairs their function and breaks the emulsion.
2. False. Emcols H-A, H-B and H-C are used to emulsify insecticides in concentrated mixed fertilizer solutions in which the salt concentration may approach saturation. These emulsifiers have a unique tolerance to high salt concentrations.
3. False. Most efficient agricultural emulsifiers are blends of several anionic and nonionic surfactants.
4. True, if properly balanced with nonionic components. Conversely, the nonionic components of such an emulsifier impart improved performance in hard water.
5. False. It is not sufficient to balance the anionic-nonionic ratio. Since both anionic and nonionic components have hydrophilic and lipophilic properties, each in turn must be properly balanced to obtain maximum efficiency at the minimum use level. This requires blending several components, in some cases as many as 12 different surfactants.
6. False. The composition of the separate components and their balance is the prime consideration.
7. True. This is achieved most conveniently by the use of matched pairs of emulsifiers.
8. False. The rate of dilution required by the particular field application affects the blend of the matched pair necessary for optimum performance.
9. True. An excess of nonionic may result in excessive creaming which can easily be redispersed, but an excess of anionic may result in a tendency toward oil separation.
10. Only you can answer this. If you are using Emcols, you are saving money because they can be used at low use levels and give outstanding aging stability. Low moisture content, the rigidly controlled components, and Emcol know-how allow you to manufacture superior concentrates at competitive prices.

SCORING: If most of your answers were correct, you definitely have emulsifier "know-how". And most formulators with "know-how" look to Emulsol for leadership in the field of emulsifiers for the pesticide industry. This leadership is based on continued **research** into new problems which arise such as liquid-pesticide, liquid fertilizer formulations . . . on rigid **control of production** by an outstanding staff of chemists . . . on **technical service** to help you with your particular problems.

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HOW TO GET THE MOST FOR YOUR FERTILIZER MACHINERY DOLLAR

Before You Buy, Check Sturtevant's Answers to These Key Questions

Q - How much experience is built into the design?

A - You get the benefit of 84 years of practical fertilizer industry experience in each Sturtevant machine you buy. Unrivaled for fertilizer plant engineering know-how, Sturtevant originated the 'Unit' idea. Whether your need is for a replacement pulverizer or mixer, or a completely modern granulating unit, Sturtevant-engineered machinery always can be depended upon to fit your requirements like a glove.

Q - Is the machinery engineered for peak-load efficiency?

A - All details in each Sturtevant machine have been proved by years of peak-load performance in fertilizer plants. Rugged construction that withstands the most slam-bang use, gears designed to always perform dependably, bearings that stand up under the heaviest loads, all can be taken for granted in Sturtevant machinery. Many Sturtevant machines have been operating at top capacity and efficiency for well over a quarter of a century.

Q - How accessible is the machinery for clean-outs and repairs?

A - Clean-outs are a constantly recurring problem in the operation of a fertilizer plant. And minor repairs on hard-to-get-at machinery can consume hours of costly man and production time. Sturtevant's practical "Open-Door" design guarantees quick accessibility — for clean-outs and repairs. Any parts requiring cleaning or maintenance are quickly exposed by "One Man in One Minute".

For rugged, reliable, efficient machinery you can depend upon for years — or for engineering assistance in planning or upgrading your fertilizer unit — it will pay you to consult Sturtevant. Write to STURTEVANT MILL COMPANY, 123 Clayton St., Boston 22, Mass.

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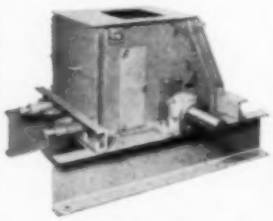
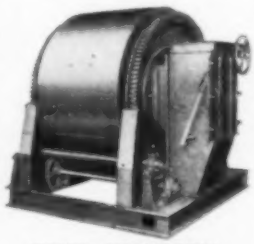
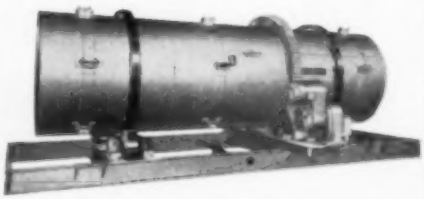


ROTARY PULVERIZER



MIXER - AMMONIATOR



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For further information, write Sturtevant today.

STURTEVANT MILL CO.

Dry Processing Equipment

The "OPEN-DOOR" to *lower* operating costs over *more* years

Clinton Nurseries, Clinton, Conn. Continental Chemiste Corp., Chicago, presented its Bug-Tab insecticide based on the fogging principle of insect control.

O. E. Linck Co., Clifton, N. J., demonstrated its new liquid lawn sprayer that is said to apply chemicals accurately and easily. The sprayer is offered as a complete unit or as a frame that can be adapted with a tank sprayer or gallon jug.

•

Spencer Offers Process

The Spencer Chemical Co., Kansas City, Mo., is offering information on a pre-neutralization process for manufacturing non-phosphate fertilizer grades, such as 14-0-14, and inverted grades, such as 20-10-10, without the use of dry nitrogen materials.

Developed by the Virginia-Carolina Chemical Corp., Richmond, Va., the process involves reacting the free ammonia in a nitrogen solution with sulfuric acid before adding it to the mixer. The process was disclosed by Virginia-Carolina at the 1957 Fertilizer Round Table where they pointed out the possibilities of using it to obtain quantities of nitrogen from solutions when making non-phosphate grades. Spencer has been exploring the potential of pre-neutralization at its mixed fertilizer demonstration plant, where the process was extended for use in granulating inverted ratios.

•

To Sponsor Grants-In-Aid

An agricultural research program of grants-in-aid, totaling nearly $20,000, will be sponsored in 1958-1959 by Climax Molybdenum Co., a division of American Metal Climax, Inc., New York. The program involves work at six universities and two independent research foundations.

Laboratory tests and field trials will be designed to gain insight into crop responses to molybdenum on various specific soils, and also the degree of response of these crops when seed-treated with molybdenum.

Palm Named Cornell Dean

Dr. Charles E. Palm was made Dean of the New York State College of Agriculture at Cornell University, Ithaca, N. Y., effective July 1, 1959.

Dr. Palm succeeds W. I. Myers, who is retiring after 16 years as dean and 45 years on the Cornell faculty. Dr. Palm presently is director of the Cornell Agricultural Experiment Station and is research director for the State Colleges of Agriculture and Home Economics. He is a former head of the university's Department of Entomology and Limnology, and a past president of the Entomological Society of America.

As dean of the New York State College of Agriculture, Dr. Palm will be the administrative head of one of the nation's largest agricultural colleges. A unit of the State University of New York, the college has nearly 1600 undergraduate students—second only to Iowa State College among the nation's agricultural colleges in this respect.

Dr. Palm was graduated from the University of Arkansas in 1931 and was appointed as an assistant at Cornell in 1932. He became an instructor in 1934, received his Ph.D from Cornell in 1935, and was appointed assistant professor in 1937. A year later, he was named professor and head of the entomology department. In June, 1957, Dr. Palm was appointed director of the Cornell University Agricultural Experiment Station and research director of the State College of Agriculture.

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Carbide Reassigns Four

Four technical representatives have been transferred by the Union Carbide Chemicals Co., division of Union Carbide Corp., New York.

D. Wallace Enright has been transferred from Charlotte, N. C., to the Chicago district; Alan J. Lyon moves from the general sales office to the Charlotte district; Alan R. Mitchell shifts from New York to the Philadelphia district; and Joseph L. Suhadolnik moves from the general sales office to the Newark district.

•

Davison Shifts Four

The Davison Chemical Division of W. R. Grace & Co., Baltimore, has announced an expansion in personnel and realignment of sales territories for Davison triple superphosphate.

George Klein has been assigned the central territory east of the Mississippi, from Tennessee to Wisconsin; Basil Wagner operates in North and South Dakota, Nebraska, Iowa, and Wisconsin; K. C. Brutcher covers the Southwest; and J. G. Carrol the eastern territories. All men are veterans of the Davison organization.

•

Funk Named To CSC Sales

The Commercial Solvents Corp., New York, has named Louis L. Funk to its agricultural chemicals marketing and distribution organization in the Midwest.

Mr. Funk will cover Indiana, Michigan, and Northern Ohio. His headquarters are at the company's Cincinnati, Ohio, district office.

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Virginia OK's Mixtures

The sale and distribution of fertilizer-pesticide mixtures containing aldrin or heptachlor will be permitted for the 1959 season by the Virginia Department of Agriculture.

Permits for sale and distribution, however, will be given only when the product is properly registered, packaged, and labeled. Mixtures recommended by the Virginia Experiment Station are for control of the Southern rootworm attacking peanuts; for the rootworm, seed corn maggot, and wireworms attacking corn; and for the control of alfalfa weevil attacking alfalfa.

•

25th Pest Control Meeting

The National Pest Control Association held its Silver Anniversary Convention Oct. 20 to 23, at the Statler-Hilton Hotel in Washington, D. C.

A session on planning and public relations in the pest control industry included talks on advertising, costs, and public relations programs. Silica dusts for insect control were discussed by Dr. Barry L. Tarshis, U. of California; Earl K. Seybert, Davison Chemical Co.; and Dr. R. J. Norton, Crop Protection Institute, Durham, N.C. The significance of current trends in pesticide regulation was told by John Conner, attorney for the National Agricultural Chemicals Assn.

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By the Push-button Process

Ammonia plant start-up operations are virtually a matter of "push-button" routine with Chemico; for Chemico has designed and constructed more than 50 ammonia plants in the last 40 years.

While new-comers to the field are constantly running into costly difficulties and delays with unreliable and even untried processes, Chemico designed plants are profitably producing an estimated 25% of the world's synthetic ammonia. Investors in the chemical industries may be interested to learn that despite the proven performance and countless advantages of Chemico's ammonia processes, it frequently costs less to build a Chemico Plant.

Write today for Chemico Bulletin #357 which lists the alternate feed stocks and methods for gas purification and production in the making of ammonia.

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Encourage Grub Treatment

At least one major meat packer has announced that it will pay up to $1 per head to cattlemen for the cost of treating their cattle with a systemic grub killer. The move was announced last month by Iowa State College, Ames, Iowa, where tests are being conducted with newly developed systemic livestock insecticides.

The new packer offer is to stimulate the use of systemic livestock insecticides as a method of improving beef carcasses. The two types of systemic insecticide currently available are: Co-Ral, a spray manufactured by the Chemagro Corp.; and Trolene, a pill manufactured by the Dow Chemical Co., Midland, Mich.

•

Fall Fertilizer Response

In tests conducted at the Lacombe Experimental Farm, near Ottawa, Canada, fall applications of nitrogen-phosphorus fertilizer produced a half-ton more of dry matter per acre than spring applications. Straight nitrogen, however, gave very little increase when applied either in the fall or spring.

A grazing study was carried out at Lacombe over a 79 day period. Pastures on a sandy loam to light loam soil were treated with 200 pounds of 16-20-0, with the following results: On an alfalfa-brome and fescue pasture, an increase of 50 pounds of beef per acre was obtained. On a straight brome pasture, the increase amounted to 117 pounds of beef per acre.

•

Westvaco Expands In South

The West Virginia Pulp and Paper Co., has enlarged the sales and service organization in the southern region of its Multiwall Bag Division. The southern region maintains sales districts from Florida to California.

Henry M. Howe has been named sales manager for the Atlanta district and Frank L. Smith is sales manager for the Torrance, Calif., district. The company also shifted the Denver office to the jurisdiction of the Torrance district and appointed C. Shannon O'Neill as export sales representative, with headquarters in New Orleans. A major change in operations announced by the Multiwall division was the appointment of Arthur A. Knodel as a multiwall superintendent of the New Orleans plant.

Start Phosphate Production

Central Farmers Fertilizer Co., Montpelier, Idaho, has started phosphate ore production at Georgetown Canyon to service an elemental furnace complex under construction near Phosphoria Gulch. A two-mile long, 36-inch-wide belt conveyor system delivers 400 tons of ore an hour to the Phosphoria Gulch stockpile.

TRIPLE THREAT CHEMICAL!

SPRAYS • DUSTS • FERTILIZER

TRIANGLE BRAND **COPPER SULFATE**

Successful growers prefer fertilizer and fungicide formulations containing Triangle Brand Copper Sulfate. They know that in fertilizers it is necessary for enrichment of the soil; in fungicidal sprays, where Bordeaux Mixture is the most reliable, or in copper dusts, Triangle Brand Copper Sulfate has definitely proved its superiority over organic materials.

Use of Triangle Brand Copper Sulfate in sprays, dusts and fertilizers results in larger and healthier crops, meaning MORE PROFIT for the grower and MORE PROFIT for the mixer or formulator who serves him.

Triangle Brand Copper Sulfate, which will increase your profits, comes in these convenient forms:

INSTANT (powder) for quick and efficient mixing of Bordeaux sprays.
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Contact us today for further information on Triangle Brand Copper Sulfate and its use in agricultural formulations.

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JET-O-MIZER

The modern mill for processing heat sensitive organic toxicants

Pesticides and fungicides in concentrates and field strength wettable powders and dusts, using BHC, Chlorodane, DDT, Dieldrin, Endrine, Heptachlor, Toxaphene and similar organic toxicants, can now be prepared with ease, using the Fluid Energy "Jet-o-mizer."

This heatless, motionless mill processes these low melting point, heat sensitive materials with a minimum of mill build-up. There are no moving parts to generate heat, no screens to plug.

Formulation is simplified too. Inerts do not compact . . . there is no lowering of oil absorption value. Consequently, less high priced carrier is needed . . . more lower cost extender can be used.

And there are other values to Fluid Energy processing of these important agricultural chemicals:

- The "Jet-o-mizer" grinds "coarse" . . . for specifications calling for 325 mesh products. Or they grind fine . . . as low as ¼ micron average, or to satisfy WHO and ICA requirements.
- The "Jet-o-mizer" is versatile . . . it handles a wide range of raw materials and products well . . . it is ideally adapted to off-season grinding of inerts and other materials.
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- The "Jet-o-mizer" efficiency at the fine grind end of the spectrum improves residual toxicity of most pesticides.
- The "Jet-o-mizer" combines many operations . . . wet clays can be dried, ground, blended with toxicants and classified . . . all in one operation.
- The "Jet-o-mizer's" superior blending and grinding reduces the need for costly preparatory equipment.
- The "Jet-o-mizer's" perfect partner for high product recovery is the patented "Jet-o-clone" . . . designed specifically for fine particle collection.

Investigate our facilities for product testing and custom grinding.

Investigate the *extra profit* possible with "Jet-o-mizing!"

The "Jet-o-mizer" uses air as the elastic grinding fluid . . . there are no moving parts . . . no heat from grinding . . . low maintenance.

Send for our new bulletin describing "Jet-o-mizers" and "Jet-o-clones."

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A typical Fluid Energy Mill installation, in continuous operation for more than ten years.

Soil fertility programs expanded in South; Forest fertilization and fertilizer in the role of improving farming efficiency highlight TV shows in the West; Midwest schedules eight Seed and Fertilizer Clinics.

In the South

THROUGH a special arrangement with the University of Georgia, Dr. Lawrence C. Walker has accepted a temporary appointment as chief forester for the National Plant Food Institute. He is on leave from the university for the assignment.

Dr. Walker's primary responsibility is to summarize and evaluate forest fertilization work currently under way in the Southeastern states and to explore the need for a coordinated program of research activities in this field. He is assisted by a six-man college-industry task force. Dr. Walker currently is associate professor of forestry.

Specifically, Dr. Walker is working to determine the nature and extent of forest fertilization studies now under way, determining those areas in which duplication exists. He then hopes to devise a plan of research under which the efforts of the land-grant colleges, the pulp and paper interests, and the fertilizer groups can be coordinated for maximum effectiveness. Studies to determine the economic feasibility of fertilizing forest trees of various species under different soil conditions will be set up and sponsored initially by the NPFI.

Georgia's intensified soil fertility program is being expanded during the 1958-59 season to 25 additional counties. The NPFI again is helping to support the program, which is being conducted by the Georgia Agricultural Extension Service.

Dr. Lawrence C. Walker

This season's pilot project was designed to test techniques and evaluate the effectiveness of an intensified educational campaign upon Georgia farmers. A preliminary evaluation of results indicated significant change in the fertilizer buying habits of farmers in the six pilot counties.

While sales comparisons are not yet available on a tonnage basis for all of 1958, consumption data for the January 1 through July 31 period show that farmers used less of the non-recommended grades and more of the recommended grades. Also, there was a significant increase in consumption of fertilizer grades high in potash and the consumption of nitrogen both in mixed fertilizer and as straight materials was up.

North and South Carolina, also, are intensifying soil fertility programs. Three Ruritan Clubs in Currituck County, North Carolina, started a concentrated soil testing drive last month in an effort to obtain soil samples from every field in the county. The project was set up as a contest, with the various communities competing against one another. Analyses of all samples taken are being carried out by the state soil testing laboratory at Raleigh and fertilizer and lime recommendations will be made in accordance with the tests.

The Plant Food Institute of North Carolina and Virginia, The American Potash Institute, and the National Plant Food Institute cooperated in the soil testing drive.

Much the same type program was conducted last month in Edgefield County, South Carolina, and was supported by a grant from the NPFI. The South Carolina Extension Service indicates that the pilot project will be expanded in the future to include other counties in the state if the Edgefield County undertaking proves successful.

The University of Maryland and the NPFI have established an undergraduate agronomy scholarship at the university. Each year a junior or a senior undergraduate majoring in agronomy will be selected as the recipient of the award which will consist of a $200 cash award, a plaque which will be retained by the University, and a key inscribed with the winner's name. An agronomy scholarship also was set up recently at Clemson Agricultural College in South Carolina.

A $2,000 NPFI research grant was awarded to the Tennessee Agriculture Experiment Station last month to support studies on yield response of corn to different fertilizer treatments on various soil mapping units and under different rainfall patterns in Tennessee. The work is being carried out jointly by the Departments of Agronomy and Agricultural Economics of the Tennessee station.

THE MAN WITH THE ★ MULTIWALL PLAN

UNION PACKAGING SPECIALIST WALTER STALER

helps packer cut his Multiwall costs by $60,000

Union Packaging Specialist Walter Staler is an economy expert. His Multiwall customers can vouch for it. One of them—a Midwest packer—recently asked him to analyze his bagging operation. Savings to the company are expected to hit $60,000 a year!

The analysis, made through Union's 5-Star Packaging Efficiency Plan, showed that the basis weight of each bag could be reduced by 20#. Another recommendation: Standardize all Multiwall styles and sizes to improve inventory control and simplify purchasing.

Union Multiwall Recommendations are based on this 5-Star Packaging Efficiency Plan

- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

Union also suggested simplifying bag printing by changing it from two-color on both sides to two-color on one side. And, switching from a full white to a less expensive semi-bleached sheet. These improvements, together with new work and copy created by Union's Art Department, resulted in a more attractive, more economical package.

This $60,000 savings story is another example of what can happen when Union's 5-Star Plan goes into action. Why not put it to work in your plant?

Better Multiwall performance through better planning

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UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS

UNION BAG-CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

The third annual Southeastern Fertilizer Conference in Atlanta, Ga., Oct. 29-30, gave considerable attention to the promotion of soil testing which led to improved fertilizer practices this year in two N. Carolina counties.

Dr. J. W. Fitts, N. C. State College, moderated a panel discussion on acquainting North Carolina farmers with their fertilizer needs. Roles played by county agents, fertilizer dealers, bankers, and chambers of commerce were covered by the panel. The soil testing promotion projects were carried out in Hoke and Scotland Counties of North Carolina.

In the Midwest

EDWARD R. Schumann has been named a district representative of the NPFI with offices at St. Paul, Minn. Mr. Schumann covers the states of Minnesota, North Dakota, South Dakota, and Wisconsin.

Following completion of scholastic work at the University of Illinois, Mr. Schumann served with the U. S. Army Chemical Corps where he was associated with the crops division at the Biological Warfare Laboratories, Fort Dedrick, Md. He worked on field surveys and fertility maintenance, soil sampling, analysis, lime and fertilizer recommendations, and field trial projects involving various fertilizer treatments.

A series of eight Seed and Fertilizer Clinics is scheduled for various Illinois cities during late October and early November. The meetings are being sponsored jointly by the Illinois Seed Dealers Assn., the Midwest regional office of the NPFI, and the University of Illinois. Meetings during November will be held at Springfield, Urbana, and Effingham. Fertilizer topics on the program include a report on recent developments in the use of fertilizer, fall application of fertilizer, and a discussion period on the most pressing problems concerning fertilizer and soil fertility. Speakers will include staff members of the Department of Agronomy at Univ. of Illinois.

During October, meetings were held at Benton, Macomb, Kewanee, DeKalb, and Joliet.

In the West

A ONE day Western Range Fertilization Conference attracted some 300 livestockmen, range managers, agricultural workers, and fertilizer industry representatives to the Riverview Country Club, Redding, Calif., Oct. 27.

Panel discussions were held on range fertilization in the Western states, and California range fertilization. Charles W. Bourg, chairman of NPFI's Western Research and Education Committee, and Malcolm F. Rice, agronomist with the California Fertilizer Association, moderated the two panels.

"Science in Action", a weekly television series presented over station KRON-TV in San Francisco, devoted one of its half-hour programs last month to the topic, "Our Hungry Soil". Dr. Richard Bahme, Western Regional Director for the NPFI, was a guest on the show, a public service science production. Dr. Bahme pointed out the important role fertilizer plays in improving farming efficiency and lowering costs of food to consumers. Scenes from the Institute's film, "Making the Most of a Miracle", also were used on the TV program as were other Institute teaching aids.

Carl Schroeder of the Crown Zellerbach Corp. told a special

Dr. Richard Bahme (left), NPFI Western regional director, and Dr. Earl S. Herald, host of the "Science In Action" TV program, discuss the role fertilizer plays in improving farm efficiency in the show presented over a San Francisco station last month.

school on forestry management at Pack Forest, Wash., Sept. 3 to 5, that the proper use of timber resources requires utilization of all good management practices presently known, in addition to the development of many new methods in the future.

Naturally, Mr. Schroeder continued, the proper use of fertilizer and farm chemicals will play an important role in the future, if the economics prove feasible. The meeting was sponsored by the University of Washington and the National Plant Food Institute.

F. Todd Tremblay, Pacific Northwest regional director for the Institute, opened the school and pointed out that the Pack Forest session would be the first in a series of annual meetings aimed at acquainting the fertilizer industry with the modern techniques involved in growing trees.

Two fields of forestry research which need to be thoroughly investigated are the proper use of fertilization and forest tree genetics, according to Ted Yocum, a forester with the Simpson Timber Co. He said that there are approximately 30 million acres of land devoted to growing Douglas fir trees and related species in the Pacific Northwest and this acreage

(Turn to page 113)

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A · *Russian knapweed* B · *Austrian field cress* C · *Bermuda grass* D · *Bindweed* E · *Hoary cress* F · *Canada thistle* G · *Leafy spurge* H · *Quack grass* I · *Johnson grass*

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Sodium chlorate provides sterilization until it has been leached from the soil. The same treatment kills off all other weeds and grasses.

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For defoliating cotton, particularly in irrigated areas, OLDBURY chlorate is used in special formulations.

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Fertilizer, Pesticide Officials Approve Amendment to Include: Defoliants, Nematocides, Under Miller Law

FERTILIZER and Pesticide Control Officials last month passed resolutions favoring the amendment of pesticide regulations to include such products as chemical defoliants, dessicants, nematocides and plant-growth regulators under the terms of the Miller Bill. The resolutions were passed at the meetings of the Association of American Pesticide Control Officials and the Association of American Fertilizer Control Officials.

The meetings were held in Washington, D. C., Oct. 17 and 18.

Lea S. Hitchner, executive secretary of the National Agricultural Chemicals Association, addressed the meeting of the pesticide officials and told them that NAC is proposing presentation of such an amendment before the coming session of Congress. At the present time, defoliants, dessicants, and growth-regulators are subject to supervision by the Food and Drug Administration as food additives under the newly-enacted food additives law. Nematocides, however, are not covered by any federal law.

There are three primary objectives involved in the proposal to broaden the scope of the Miller law and transfer the three groups of chemicals from the additives law to the Miller law, Mr. Hitchner said.

It would simplify matters for the agricultural chemical industry and others concerned to have all agricultural chemicals regulated by one law instead of being spread over several laws. It would aid in maintaining uniformity of state and federal laws regulating agricultural chemicals. And it would provide more protection to farmers because, unlike chemicals covered by the additives law, those covered by the Miller law must be registered with the Department of Agriculture.

Mr. Hitchner told the state control officials that the necessary legislation will be introduced on the opening day of the next session of congress and the industry will seek its passage before congress adjourns, probably in July.

In his address to the convention, Mr. Hitchner said that today, more than ever before, a great number of factors are influencing legislation. Among those he mentioned were: minority elements; organized groups (such as were heard from at the time of the gypsy moth spraying); selfish industrial groups, who press for legislation to place a burden on another phase of industry; legislators seeking publicity; and governmental agencies seeking to enlarge their areas of influence.

With regard to state regulations, Mr. Hitchner said that the trend on the part of some states is to refuse to register certain pesticides that are in compliance with the technical requirements of the law (some states refuse to accept registration of fertilizer-pesticide combinations). He said that such refusals are unjustified. So long as a product is properly labeled and in compliance with both the fertilizer and pesticide laws, he said, it should be registered and permitted to be sold without any consideration of the economics or comparative effectiveness.

F. Herbert Gates, chief, Division of Plant Industry, Denver, Colo., addressed the pesticide control meeting and said that the period of crash programs in the pesticide industry is coming to an end. The only objective of these programs, he said, has been to control the immediate pest. Now, thought must be given to the effect of a new pesticide on wildlife and humans. Mr. Gates said that the chemical industry must intensify its public relations and it must be prepared to defend itself against propaganda attacks on pesticides. Mr. Gates is the retiring president of the Pesticide Control Officials' group.

J. J. Taylor, Florida State Chemist, Tallahassee, an outgoing president of the Fertilizer Control Officials, told the officials that the greatest single contributing factor in the transformation from scarcity of food in the world to surpluses is the tremendous increase in the use of plant nutrients. Total consumption of the three primary plant nutrients almost quadrupled between 1939 and 1955, he said, and mixed fertilizers accounted for almost three-fourths of this increased tonnage.

In recent years, he continued, the many and rapid changes in materials, production, handling, and methods of transportation and application have created problems in control with which regulatory officials were ill prepared to cope. As an example, Dr. Taylor cited the enormous increase in bulk delivery of fertilizers that has greatly complicated an inspector's sample drawing duties. Now, however, inspectors are taking their samples directly from the material in the plants, a practice that requires new sampling tools and methods.

Fertilizer consumption statistics are useful to agronomists in determining the acceptance by farmers of new fertilizers, said Woody N. Miley, extension soils specialist of the University of Arkansas, Little Rock. During the past 15 years, he said, Arkansas agronomists have made various agronomic uses of reports. They have served as the primary source of data to indicate current trends in fertilizer manufacture and fertilizer usage by farmers. Those involved in agronomic research and educational work, he said, will continue to depend on fertilizer consumption reports. Without these current data, he continued, effective evaluation and sound planning would unquestionably be hampered in future years.

E. A. Epps Jr., chief chemist with the Louisiana Department of Agriculture, Baton Rouge, present-

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Agricultural Chemicals Division, Naval Stores Department

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ed some observations on the labeling of specialty fertilizers. He said that he is concerned by the uninhibited advertising practices of some manufacturers of specialty fertilizers. He listed as objectionable such label terms as: "complete fertilizers"; "Nature's Own"; "organic"; "soil conditioners"; and "no chemical additives." Mr. Epps charged that such terms are vague and tend to mislead the purchaser (usually a home gardener) into thinking that the product will do amazing things to his garden.

Mr. Epps expressed the hope that the substantial elements in the fertilizer industry will not be influenced into selling fertilizers on a sideshow type of operation because of the over-enthusiastic promoters of specialty fertilizers. Fancy words on a fertilizer label won't do the job, he reminded.

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Canada Sales Manager

John D. Tomlinson has been appointed general sales manager for all of Canada by Nopco Chemical Canada Ltd., Toronto.

At the same time, Fred E. Brown was elected vice president in charge of production and development by the company.

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Represent PCA In Japan

The International Ore and Fertilizer Company of New York has been named to represent the Potash Company of America, Ltd. in Japan, Australia and New Zealand.

International Ore will sell PCA's Canadian production of potash.

•

Division Sales Manager

Harold E. Frederick has been named Phosphorus Division sales manager, agricultural chemicals, for the Hooker Chemical Corp., Niagara Falls, N. Y. Mr. Frederick, whose office is at Marysville, Ohio, had been senior vice president—agricultural chemicals at Shea Chemical prior to its merger into Hooker last May.

Another change in the company's Phosphorus Division involves Errol F. Cook, who has been made responsible for technical service, agricultural chemicals. Mr. Cook also served the former Shea Chemical Corp., in a technical service capacity.

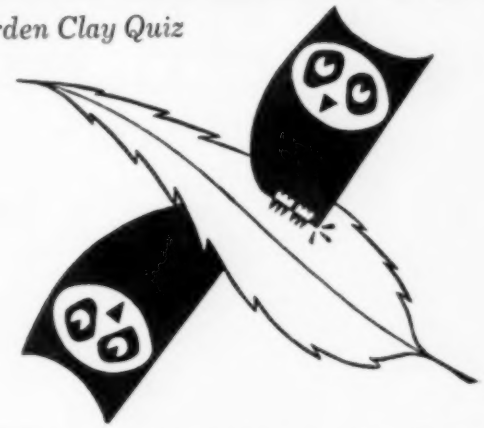
The Phosphorus Division plans to substantially expand dicalcium phosphate production at its Columbia, Tenn., plant, where the company operates two electric furnaces producing phosphorus from its own phosphate rock reserves.

Republic Firms Prices

The Republic Chemical Corp., New York, has announced a change in its pricing policy for copper sulphate and copper oxide.

Hertofore, prices fluctuated in relation to the price of electrolytic copper quoted by refiners. Republic now will quote one price, firm for a 12-month period. There will be no upward fluctuations or advances, the company said, but prices may be reduced should conditions warrant.

Barden Clay Quiz



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To Purchase Knoxville Co.

The American Agricultural Chemical Co., New York, has announced that it has contracted to purchase substantially all the physical assets of the Knoxville Fertilizer Co. with plants at Knoxville, Nashville, Johnson City, Tenn., and London, Ky.

These plants will be operated as the Knoxville Fertilizer Division of the American Agricultural Chemical Co. under the management of the present Knoxville Fertilizer personnel. The Knox line of fertilizers will continue to be sold.

•

Manages New England Area

Charles Lupsha has been named district manager of the New England area for the California Spray-Chemical Corp., Richmond, Calif. His office is in Springfield, Mass.

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Fertilizer Short Course

The Agronomy Department of Iowa State College, Ames, Iowa, is planning to sponsor a fertilizer short course that will be divided into three main parts. The main course will be held in Ames on January 7 and 8.

The first part of the course will consist of a meeting for administrative personnel of the fertilizer industry in December. The meeting will be concerned with the broad problems affecting fertilizer production and future use. The second and third parts of the short course will be similar to past short courses except that the first day is intended primarily for sales representatives and technical personnel. The second day is intended primarily for fertilizer dealers.

•

Plant Disease Slides

The extension committee of the American Phytopathological Society has prepared seven sets of colored slides depicting common plant diseases. The slides are in two by two inch cardboard mounts, numbered and filed in plastic boxes. Each set has a syllabus for identification purposes.

The slides are being offered as teaching aids for county agents, vo-ag teachers, commercial chemical sales personnel, and others interested in diseases of U. S. crops. The price is 21 cents per slide.

Titles of the seven sets are: Cereal and Forage Diseases (49 slides); Tree Fruit Diseases (51 slides); Small Fruit Diseases (52 slides); Cotton and Sugar Beet Diseases (34 slides); Tomato and Potato Diseases (45 slides); Muck Crop Diseases (24 slides); and Miscellaneous Vegetable Diseases (54 slides). They are available from the Photo Science Department, Day Hall, Cornell University, Ithaca, N. Y.

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Ohio Pesticide Meeting

The Ohio Pesticide Institute will hold its annual winter meeting at the Neil House in Columbus on Jan. 12 and 13, 1959.

Robertson Joins PCA

The Potash Company of America, Carlsbad, N. Mex., has announced the appointment of Dennis Robertson as sales representative for Florida. Mr. Robertson will work with Paul C. Ausley of the Orlando, Fla., office and comes under the general supervision of W. H. Appleton, Southern Sales Manager. Mr. Robertson's headquarters are in Atlanta, Ga.

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Calspray Names Three

The California Spray-Chemical Co., Richmond, Calif., has announced the appointments of two regional managers and a district manager. George W. Oliver fills a newly-created position as regional manager—Northeast from an office in Washington, D. C.

E. J. Stripling is regional manager for the Southeast, another newly-created position, and Cecil M. Crutchfield has been named district manager of the South Central area. For the time being, Mr. Stripling's headquarters are in Washington, D. C. Mr. Crutchfields's office is in Dallas, Texas.

•

CFA Meeting Nov. 9 to 11

The 35th annual convention of the California Fertilizer Association will be held at the Ambassador Hotel, Los Angeles, November 9, 10, and 11. Ronald Reagan, well known actor, will be a featured speaker along with Dr. Russell Coleman, executive vice president of the National Plant Food Institute, and Roy Kennedy, credit manager of the California Spray-Chemical Corp., Richmond, Calif.

The theme of the convention is "Building For The Future". A panel, moderated by Dr. D. G. Aldrich Jr., University of California, Davis and Berkeley, will discuss the theme. Panel members include: Mr. Kennedy, speaking on sound credit planning for the fertilizer industry; R. L. Luckhardt, Collier Carbon and Chemical Corp., Brea, Calif., who will talk about fertilizer industry technology trends; and W. L. Dixon Jr., of the Pacific Guano Co. and the Western States Chemical Corp., Berkeley, Calif., who will list trends in granular material production and use. Also on the panel will be: J. Earl Coke, Bank of America, San Francisco; Demont W. Galbraith, Agriform of Northern California, Inc., Woodland, Calif.; Ralph S. Waltz, Wilson & Geo. Meyer & Co., San Francisco; and James F. Sloan, J. F. Sloan Co., Salinas.

Heckathorn Opens Utah Unit

The United-Heckathorn Co., Richmond, Calif., has started production of a synthetic cryolite at its new plant which adjoins a phosphatic fertilizer operation of Western Phosphates, Inc., in Garfield, Utah.

Although its present main objective is to supply cryolite to the aluminum industry, United-Heckathorn has hopes of increasing its

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production of cryolite and other flourine compounds in the Utah area.

•

Safe Ant Killer

Pet Chemicals, Inc., Miami, Fla., is offering an ant butter that is said to be a safe ant killer that contains no highly toxic poisons. Packaged in tubes, the product, named Holiday Ant Butter, attracts and kills both grease and sweet eating ants.

Custom Delivery System

A new technique of custom bulk delivery and distribution of solid chemical fertilizers has been developed by Wilson and Geo. Meyer & Co., Intermountain, Salt Lake City, Utah, in co-operation with Western Phosphates Inc., and Stauffer Chemical Co.

The purpose of the plan is to take fertilizer directly from a railroad siding to the farmer in bulk containers. Local dealers will own the delivery equipment and let the farmers use it as part of the sales service. The advantages of this system incude a saving of time, a better application job, and the freeing of the farmer's equipment and labor in peak work periods, according to Wilson & Geo. Meyer.

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Spencer Reaches Agreement

The Spencer Chemical Co., Kansas City, Mo., has signed a new contract with the Business Representatives Council of Joplin, Mo., bargaining agent for the 658 hourly employees at Spencer's Jayhawk Works, near Pittsburgh, Kansas.

Terms of the contract grant an additional holiday, bringing the total to seven, and an increase of seven cents per hour to members of the bargaining unit, plus other adjustments in working practices.

•

Montrose Elects Two

The Montrose Chemical Co., Newark, N. J., has elected two new directors to its board at an annual meeting held last month. The new members are Richard B. Schneider, vice president of the Empire Trust Co., New York, and Leon Quat, a New York attorney.

•

Cyanamid Names Miller Co.

The Miller Chemical Co., Omaha, Nebr., has been appointed as distributor of animal feed products manufactured by the American Cyanamid Co., New York. Miller will handle the company's line in Iowa, South Dakota, Nebraska, and Kansas.

Miller formulates insecticides and weed killers under its own name and has been distributing Cyanamid's animal health products for almost five years.

•

To Build In Uganda

The Uganda Development Corp. plans to build a plant for the production of 400,000 tons of phosphate per year in Sukulu, Uganda, East Africa. The present East African imports of phosphate-based fertilizers total some 20,000 tons annually.

A Renneburg Continuous Combination Ammoniator-Granulator, a Renneburg DehydrO-Mat Dryer with special refractoryless gas-fired furnace, and a Renneburg Straight Shell Cooler . . . being installed in a 30-ton-per-hour granular plant of one of the leading mid-western fertilizer producers.

RENNEBURG CONTINUOUS COMBINATION AMMONIATOR-GRANULATOR

This rugged and highly-versatile unit is being used for government research work and experimentation in plant size quantities.

Other chemical and fertilizer processing equipment manufactured by Renneburg includes: • Ammoniators • Granulators • Dryer Furnaces • Complete Air Handling Systems • Pilot Plants • DehydrO-Mat Combination Dryers and Coolers

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SunOlin To Make Urea

SunOlin Chemical Co., Wilmington, Del., a joint subsidiary of the Olin Mathieson Chemical Corp., Baltimore, and the Sun Oil Co., Philadelphia, has been formed with the intent to produce urea.

James I. Harper of Sun Oil has been named president of SunOlin and the vice president is S. S. Johnson of Olin Mathieson. Other SunOlin officers are J. R. Sanderford, secretary and assistant treasurer; Joseph T. Wilson Jr., treasurer and assistant secretary; and Joseph R. Layton, comptroller. Mr. Sanderford is from Olin Mathieson and Mr. Wilson and Mr. Layton are from Sun Oil.

•

Grace Assistant Manager

Page Edmunds has been named assistant general manager of chemicals in the W. R. Grace & Co., Davison Chemical Division, Baltimore. In addition, Mr. Edmunds has been named vice-president of Davison Chemical Co., Ltd., the division's Canadian affiliate.

Formerly Mr. Edmunds was general sales manager, petroleum chemicals.

•

IMC Enrolls 38 In Schools

Thirty-eight young men and women are enrolled in U. S. colleges and universities this fall under a scholarship program sponsored by the International Minerals & Chemical Corp., Skokie, Ill.

Since the inception of the program in 1947, International has awarded 98 scholarships to high school graduates, 26 of whom have completed four-year college courses with degrees. Twenty-eight of the graduates received special, one-year awards.

•

Selling Cincinnati Area

Ralph B. Morton has been named Cincinnati area salesman for the Atlas Powder Co.'s chemicals sales department. He joined Atlas last year and had been assigned to the Chicago regional sales office as a technical correspondent.

R. H. Schaub

R. E. Lasher

Name Lasher and Schaub

Lasher and Schaub Associates has been appointed by the Munson Mill Machinery Co., Utica, N. Y., as an exclusive sales representative for the firm in the state of New York, except for the metropolitan area.

Richard E. Lasher, a former Munson employee was associated with the company as a draftsman in 1921. He served as a salesman, sales manager, chief engineer, and general manager until 1936. Since World War II, he has devoted his time to his private engineering practice which consisted mainly of the engineering design and development of grain elevators and feed manufacturing plants along with machinery sales.

Mr. Lasher's associate, Robert H. Schaub, opened his own sales engineering office in Utica in 1948 and has worked with various industries.

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read these facts on carrier compatibility

Phosphate decomposition can usually be traced directly to the carrier. Unless the carrier is uniformly produced, has the proper pH, and has a low moisture content, you will *always* have trouble with product stability. And, as toxicant manufacturers know only too well, an unstable product does not build good customer relations.

That's why manufacturers turn to Pike's Peak Clay . . . a uniformly produced carrier in sizes from 325 mesh up to ½". Its exceptionally low moisture content and ideal pH of 5 far exceed the normal performance standards of other carriers. In addition, it is less hygroscopic and has free-and-easy flowability. But probably one of the most important benefits you get with Pike's Peak Clay is that this one carrier is equally as outstanding for *both organic phosphates and for hydrocarbons. Yes, . . . only one carrier to buy . . . one carrier to store . . . one carrier to use.*

Write today for a sample of Pike's Peak Clay for laboratory testing. Or, better still, call GRaceland 7-3071 in Chicago. But, do it now.

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Fertilizer Industry Problems Highlight ARI Conference

A DISCUSSION of problems relating to agriculture in the fertilizer producing industry, highlighted the opening session of the Agricultural Research Institute, held October 13 and 14, at the National Academy of Sciences, Washington, D. C. Vincent Sauchelli, National Plant Food Institute, moderator of the panel, opened the review with a brief outline of the size of the fertilizer industry. He cited USDA figures showing an annual consumption of more than 22 million tons of fertilizer per year, at a cost of about a billion dollars.

M B. Gillis, International Minerals and Chemical Corp., continued the review of fertilizer production, emphasizing technological problems. He observed that the greatest recent single advance in fertilizer manufacture is the production of granular materials. The highest share of the market for granulated materials has been in north central areas, he said,—and the least in the south-atlantic regions.

Granulated fertilizers have increased costs of production, require more skill, and the selection of materials is limited. There is little doubt, however, that the market for granulated materials will continue to increase. Other advances in the fertilizer industry, he indicated, may be expected in the production and use of phosphatic materials.

Mr. Gillis noted that some of the current problems of the fertilizer manufacturer are complicated by the numerous grades of fertilizer made. The production of many grades, he noted, is not only inefficient, but not desired. He urged the industry to accelerate the program to reduce the number of grades produced.

The trend toward high analysis plant foods presents several manufacturing problems, noted Mr. Gillis. For one, raw material sources for these fertilizers are limited, requiring high analysis materials. Although freight and trucking costs are lower, there is greater danger of nitrogen loss, and increased difficulty in controlling grade without exceeding the grade. Improved production techniques, of course, meet these technological demands,—but at the same time even these techniques contribute to making fertilizer manufacture a complicated industry, where it becomes increasingly important that adequate return be received on the investment.

Edwin Cox, chemist and engineer, reported to ARI members on various business problems of the fertilizer industry. He, also, urged that some agreement be reached on the number of fertilizer grades to be handled. He noted that Flor-

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ida, the state that uses the largest quantity of mixed fertilizer, had 972 grades registered last year. North Carolina, on the other hand, which is the second largest user of mixed fertilizers, had only 43 grades listed. Methods of analysis and sampling, high analysis materials, and limitations of distribution, are some of the projects the industry has under investigation.

Research and development problems were reviewed by Eugene D. Crittenden, Allied Chemical Corporation, who stated that the future of food sources is dependent on the advances to be made in: present crops, improved crops (hybrid), new crops, other sources such as ocean, seas and lakes. Advances may be expected in new pesticides, such as the systemics, in use of urea, and development of other new agricultural chemicals. A great deal is known about phosphate metabolism, he said, but more needs to be known about potash and nitrogen. Studies along these lines, he indicated, will be an important phase of future agricultural research.

Speaking from the floor, E. V. Komarek, Greenwood Seed Co., Thomasville, Ga., urged manufacturers to take greater stock of what their products do for their customers. As a user of $50,000 worth of fertilizer a year, Mr. Komarek said that he feels entitled to more service. Numerous discussions at industry meetings, he said, have emphasized the highly competitive status of the fertilizer industry, and it would seem obvious that "the company most likely to stay in business in this high competition, would be the one offering and giving the best service." As an example, he noted that he would be very much interested in learning how to increase the yield of his hybrid seed corn by 10 per cent,—and some fertilizer manufacturer ought to make an effort to help him.

Mr. Komarek also voiced dissatisfaction with some of the recommendations given him, as well as others that should have been given him, yet were not. The fertilizer manufacturer, he said, has been urging farmers to use more and higher grade fertilizers, without investigating precise effects in specific regions. Not too long ago, he said, a program was underway "to push potash." There was no warning, however, that potash is a lye, and can damage seed. The manufacturer, Mr. Komarek believes, should be sufficiently interested in his own product and his customers, to follow the product out to the field and be sure it is used correctly. He concluded by expressing the opinion that the manufacturer can best help himself by helping his customers,—and taking a strong interest in the performance of his product in actual application.

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New Chemicals for Agriculture

A two-day joint meeting sponsored by the Commercial Chemical Development Association and the National Agricultural Chemicals Association will be held, starting on November 20 at the Lord Baltimore Hotel, Baltimore, Maryland. The theme of the meeting is "New Chemicals For Agriculture."

According to co-chairman, L. S. Hitchner of N.A.C.A., and Carl Pacifico of the American Alcolac Corporation, a well-rounded program is planned. The first day's session will feature panel discussions by prominent figures in the agricultural chemical field. On the second day a meeting, tour and demonstration will be held at the U. S. Department of Agriculture's Research Center at Beltsville, Maryland. Highlight of the meeting is expected to be an address by a top level government official.

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Iraq Invites Tenders

The Development Board and Ministry of Development of the Republic or Iraq have invited qualified firms to tender for the engineering, supply, erection, and commissioning of a fertilizer plant in that country. Bids must be submitted by Dec. 15.

To Sell For Tryco Co.

The Tryco Manufacturing Co., Decatur, Ill., has named Arden E. Malzahn as its sales representative for Minnesota, Wisconsin, and Northern Iowa.

Tryco manufactures crop spraying equipment, liquid fertilizer application equipment, dynamometers, and minimum tillage tools.

•

Ban Pomace With DDT

Apple pomace containing DDT has been declared not suitable as feed for dairy animals by the Food and Drug Administration. The FDA also said that pomace containing DDT is not suitable as a feed for meat animals.

Investigations by the FDA have shown that apple pomace containing substantial amounts of DDT has been used as feed for dairy and meat animals. Since there is no tolerance for DDT in milk, apple pomace containing any DDT cannot be used for dairy animals. In addition, the FDA ordered that unless a grower of meat animals is in a position to establish that the DDT residue in the apple pomace and the conditions of feeding are such that the meat will be within the established tolerances, apple pomace should not be used in the feeding of meat animals.

•

Move Atlanta Office

The Atlanta District Office of the Union Carbide Chemicals Co., division of Union Carbide Corp. has been moved to 1371 Peachtree Street, N.E., Atlanta 9, Ga.

•

Fertilizer Solutions Meeting

The National Fertilizer Solutions Association, will hold its annual meeting November 16 to 18 at the Netherland Hilton Hotel, Cincinnati, Ohio. The program will include discussions dealing with production and inventory control; production equipment; application equipment; and standardization. Another feature of the meeting will be an address on "Planning sales for short season selling."

Vermiculite Seed Cube

A vermiculite seed cube, made of such plant foods as bone meal and dried blood with a vermiculite base, has been developed in Britain and is said to double or treble the weight of most crops.

Reported by John Symons & Co., Ltd., Totnes, Devon, the cubes measure approximately one half inch. They have a small hole into which the seed may be pressed. The cube is then planted in the soil and the process of transplanting and thinning is avoided, according to the report. The plant feeds on the cube, saving manure and fertilizer.

•

Heads St. Louis Branch

James G. Jackson has been appointed sales manager of the Chase Bag Company's St. Louis branch. The sales territory served by the branch includes portions of Missouri, Iowa, Illinois, Indiana, Kentucky, Tennessee, and Arkansas. Mr. Jackson has been with Chase for 10 years as a sales representative in the St. Louis area.

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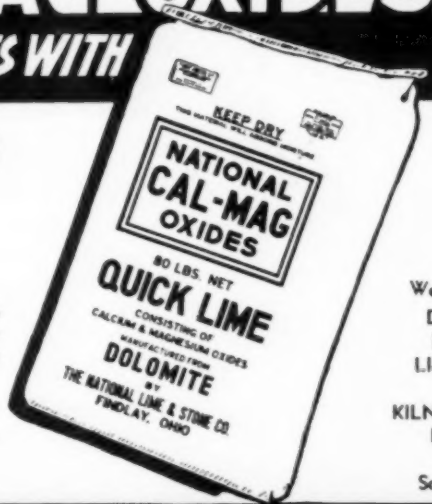

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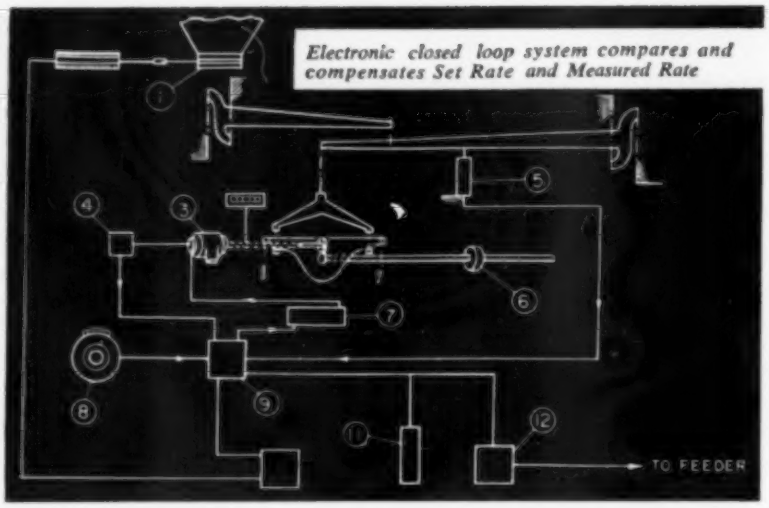


Electronic closed loop system compares and compensates Set Rate and Measured Rate

New Continuous Formulating System

Combines Thayer Scale's superior mechanical accuracy with the sensitivity of electronic compensating controls

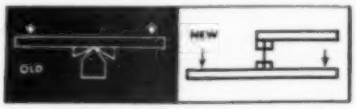
Instantly responsive to 0.1% rate deviations in accuracy.

Thayer announces a radically new weight control system for processing hard-to-handle solids or liquids. This new loss-of-weight system provides rapid formulation with high sustained accuracy at rates up to 5 tons per hour.

Thayer Scale

A material hopper, (1) supported on a Thayer Flexure Plate Scale, is automatically filled to a selected weight and the scale is brought to balance by connecting a servo motor (3) and weight transducer (5) through a relay matrice (9). The poise (6) is then retracted, at a set rate (Dial 8), a potentiometer selects a voltage and a tachometer (4) measures the poise retraction rate. These variables are compared and differences are amplified (7) and sent to the servo motor maintaining zero error. The transducer senses deviations from balance and sends a signal to the controller (12) determining the rate of discharge. Should the system abort, an error circuit (11) will sound an alarm and interrupt the operation.

This closed loop system will maintain a constant speed control over long periods and its accuracy is not dependent upon wearing parts. The operation can be programmed by means of Thayer AUTOWEIGHTION Punch Cards. Indicators and recorders can be installed at remote locations.



THAYER FLEXURE PLATE LEVERAGE SYSTEMS are guaranteed to retain their accuracy for the life of the scale. Vulnerable knife-edge pivots are replaced by non-wearing Thayer Flexure Plates.* Neither dirt, shocks nor vibration can effect their accuracy. **Write Thayer about any problem you have controlling processes by weight.**

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THE Thayer SCALE

***THE THAYER SYSTEM OF PROCESS CONTROL BY WEIGHT**

AUTOWEIGHTION

THAYER SCALE CORP., 4 Thayer Park, Pembroke, Mass.

VIEW OF INDUSTRY

(*From Page* 25)

it is difficult to relate their activities directly with increased fertilizer sales. However, on the field level it is beginning to show its effect. For example, in the 1957-58 fertilizer year, the institute invested rather heavily in support of a program of the University of Georgia known as the "Georgia intensified soil fertility program." Six counties in southern Georgia were selected, and with financial support and other assistance, the use of fertilizers was promoted intensely. Preliminary results indicate the consumption of fertilizers in these six counties was at least 10% greater in comparision to the balance of the state, and increased considerably over the amounts sold in this area in previous years.

Intensified programs are going to be conducted in other states this coming year, including but not restricted to Texas and South Carolina. This type of program should show its effects in our own industry, if conducted along the same general lines.

We must provide along with this type of program a far more sensible pattern of distribution to enable dealers and others along the line to have sufficient profit margins to enable them to conduct the necessary service and promotion at their level to maintain their own profit margins. National distributors and national manufacturers must also have available to them sufficient profit margins to enable them to service and to serve the consuming public with adequate education on the use of these materials.

If the industry as a whole, through trade associations or similar groups, could conduct an intensified promotional program similar to the fertilizer industry, it certainly will help considerably to starting us on the way to a more sensible and profitable program in our own industry.★★

UNITED MACHINE FACTORIES, Amsterdam, Holland, will build a fertilizer plant at Modderfontein, South Africa.

AC

CALIFORNIA SPRAY CHEMICAL CORP., announced the appointment of Dr. R. A. Fisher to the position of research entomologist. He will be located at Phoenix, Ariz.

AC

ALDEN CAREY has been appointed manager of the Stockton, Calif. plant of Sunland Industries.

AC

BANHAM AND JOHNSON is the new name of Ace Ammonia Service, Bakersfield, Calif. Principals are H. R. Benham, managing partner, and Newell Johnson, partner.

AC

WILSON & GEO MEYER & CO., has opened a new branch office in El Centro, Calif. Lee S. Oberholser is manager.

AC

LINZ NITROGEN WORKS in Upper Austria produced 369,000 tons of fertilizer in the first six months of 1958, which was 16,000 tons more than was produced a year ago.

AC

MEXICAN PRODUCTION of Frasch and recovered sulfur in the first quarter of 1958 totaled 296,477 metric tons.

AC

HUGH JONES moves to Crag Agricultural Chemicals sales headquarters at Memphis, Tennessee, it has been announced by Union Carbide Chemicals Co., Division of Union Carbide Corporation.

AC

D. D. PENNY, assistant to the manager, research and development, for the California Spray-Chemical Corp., Richmond, Calif., was honored recently for his 35 years with the company.

NACA MEETING

(*From Page 39*)

speaker mentioned tests which have demonstrated the value of treating grasses and small-seeded legumes. This makes it possible to obtain substantial improvement in stands and to extend the grass planting season. Their experience with use of gibberellic acid on turf grass stands, he reported, indicates that this growth stimulator may be useful with some strains of grasses. More fertilizer is needed, however, to produce balanced growth, when the gibberellic acid treatment is used.

Export Market

M. W. Melander, manager of the Export Division of Stauffer Chemical Co., New York, in his address "Export Horizons," outlined some of the problems that the American pesticide manufacturer faces in trying to hold his position in the export market. "Our position as possibly the principal agricultural area of the world," he reminded, "means that we must sell our insecticide products to countries with whom our agricultural products compete, to a great extent on a basis of price as surplus goods."

Another problem, he observed, is the ability of foreign producers of agricultural pesticides to obtain governmental credit insurance on a long term basis. Still other problems arise from opposition in some areas to our political ideas, or the possible action of some communistic country in mixing into and thoroughly disrupting the economics of an entire area in which we may be trying to open up or maintain an export market.

He offered the following general summary of the situation which the American agricultural chemical industry faces in maintaining its foreign markets: "As long as we are going to depend on disposing of close to 30% of our agricultural chemical products in the foreign market, we must adapt ourselves to an ever-changing horizon. This we can best do by continuing to look for new markets, expanding old ones by offering better technological assistance, better products and service and to be reconciled to the fact that we must be thoroughly flexible and ready to adjust to continuing change."★★

EYEGLASSES come in multicolors and shapes; medicines taste like peppermint; band-aids are available in decorator designs; and entire sewage systems are scented for the community's comfort. Creative manufacturers are, daily, turning similar product liabilities into positive assets, and profiting greatly for their initiative. To most *commercial greenhouses, home gardeners, indoor plant fanciers and private lawn custodians* the natural odor of fertilizer is a liability . . . and a big one! But . . . it doesn't have to be! In the D&O Industrial Odorant Labs, masking and reodorizing compounds have been developed for all types of commercial fertilizer, including those based on *urea, fish solubles, activated sludge, dried bone meal, animal manure, tankage, meat scraps and phosphate.* Turn your product liability into a profit-increasing asset by means of a tailor-made fertilizer reodorant from D&O. Write for specific details . . . today!

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FLAVOR BASES · DRY SOLUBLE SEASONINGS

GRUMMAN AG-CAT

(*From Page* 60)

(217 gal.) with a load restriction of 1,000 pounds.

The Ag-Cat will be marketed by independent distributors in the United States. Distributors already appointed are Magnolia Aviation Co., Laurel, Miss.; Sun Valley Dusting Co., San Benito, Texas; United-Heckathorn Co., Richmond, Calif.; and Mid-Continent Aerial Sprayers & Dusters, Inc., Hayti, Missouri. Sales are under the direction of C. E. Moore of Grumman.

SOIL FUMIGATION

(*From Page* 33)

Chloropicrin has been on the market longer than any other soil fumigant in general use. It is expensive and disagreeable to handle, but many vegetable growers prefer it for fumigating seedbeds. Properly applied it will kill insects, nematodes, most weed seed, and all except a few more resistant fungi.

Most of the soil fumigants used today are applied to soil for crops having a value in excess of $400 per acre. About 20 percent of the 4 million acres in this category are fumigated. In 1958 about half the tobacco (400,000 acres) in the southern states was planted on land fumigated with ethylene dibromide or DD mixture. Ten years ago only a few thousand acres were so treated. In Hawaii it is standard practice to fumigate pineapple soil.

Perhaps the greatest limiting factor at the present time for more extensive use of soil fumigants on a number of field crops is cost. For example, many different species of wireworms attack our cultivated crops, including corn. For field corn the presently effective soil fumigants are too expensive and chief dependence for avoiding wireworm damage is placed on cultural control practices or the application of a chlorinated hydrocarbon insecticide.

Another example is the wilt-nematode disease complex of cotton. Losses to the cotton crop from this complex have been greater than those caused by any other disease except possibly Texas root rot. Nematocides can control the fusarium wilt-nematode complex and thereby can double yields of susceptible varieties and appreciably increase yields of resistant varieties, but economics are the limiting factor in their wide-spread use. If the cost of fumigation treatment could be reduced to open up the market to crops yielding as little as $200 per acre annually, and only 10 percent of this crop land was fumigated, the acreage would be more than double that now treated.

Another area where soil fumigants are valuable is in nematode quarantine and eradication programs. During the past twelve years the golden nematode in a small area on Long Island, N. Y.

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has cost farmers and the Federal and State agencies more than 5 million dollars. A soil fumigation treatment costing even as much as several thousand dollars per acre might well be cheap for the country as a whole if the nematode could be eradicated and kept out of other potato producing areas.

Another example is the soybean cyst nematode recently discovered in several of our States. While the use of a soil fumigant in the production of soybeans is not economic, it would still be very valuable to have a fumigant that would eradicate the nematode and help prevent the spread of this potentially dangerous pest. Soil fumigants may also have a place in the eradication and quarantine programs for witchweed, a parasitic weed that attacks a number of important agricultural crops.

In summary, soil fumigants offer wide opportunities to the commercial producer. Damage to our crops by underground pests is enormous and still much underestimated. The practice of controlling these pests by chemicals is only in the early stages of development. The possibilities for further expansion appear to be almost unlimited. Crops are grown on more than 300 million acres each year in the United States alone and it is becoming increasingly evident that a considerable proportion of these are subject to damage by underground pests. Yet soil fumigants are being used on less than one percent of our acreage. Agriculture looks to the chemical industry to aid in developing more efficient and more practical materials in this important field of pest control.★★

HANDLING LIQUIDS

(*From Page* 31)

never be closed while filled with liquid ammonia. The filling depth of a storage tank should be watched carefully. A horizontal tank should never be filled to a height of more than 90% of its diameter. If the ammonia is cold when put in storage, a lower limit is necessary. For example, at zero degrees Fahrenheit, the liquid level should not come to more than about 75% of the tank's diameter.

Ammonia vapor, mixed with air, constitutes a fire hazard, if the amount of ammonia is between 16 and 25%. This is not really considered flammable, as it would be unlikely to occur in open air. ICC does not label it flammable. But, it is possible for the flammable range to exist in closed equipment. For this reason tanks should be well grounded. Explosion-proof electrical equipment is recommended for the storage area. Anhydrous ammonia is not corrosive to carbon steel, which is generally used for piping and storage. Copper, zinc and silver are corroded by ammonia. Consequently, the common brass valve, galvanized pipe and tin or silver solder should never be used with anhydrous ammonia, because mercury and ammonia form truly explosive compounds.

The next liquid raw material we wish to consider is nitrogen solution. Generally, what applies for nitrogen solution applies for aqua ammonia as well. Nitrogen solutions are not as hazardous as anhydrous ammonia, as far as pressure is concerned. However, the ammonia contained is volatile and must be treated with the same general respect as anhydrous. Theoretically, nitrogen solution or aqua ammonia is even less flammable than anhydrous ammonia; that is, the flammability limits are narrower. However, a spark can still cause the ammonia-air-water vapor mixture above nitrogen solutions to ignite and burn or explode. Consequently, the same precautions against fire and sparks should be taken in the case of nitrogen solutions.

The salts in nitrogen solutions cause corrosion with carbon steel, which results in some hazard to safety. When carbon steel is used, some corrosion allowance is required, but more important is the periodic inspection to make sure

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Year after year Berkshire's EMJEO* (80-82% Magnesium Sulphate) and Calcined Brucite (fertilizer grade) 65% MgO have proved to be invaluable primary plant foods—together with nitrogen, phosphorous, and potash.

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Be sure to include Berkshire's EMJEO and/or Calcined Brucite (fertilizer grade) in your mixtures as sources of available magnesium. You'll be glad you did.

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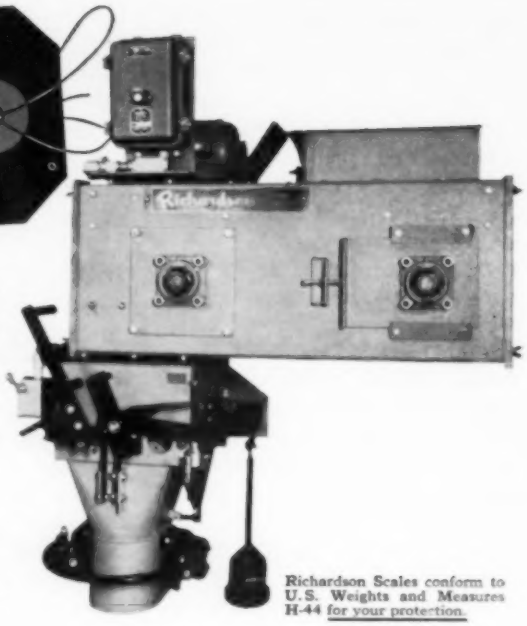
For just $1610 a RICHARDSON GA-17 FERTILIZER SCALE

gives you modern, high-speed bagging



The low, low cost attached to this outstanding *Richardson Fertilizer Scale* makes it an ideal unit for both small and large output operations. Maximum speed with excellent accuracy assures the user of both economical bagging and elimination of "give-away."

Only the Richardson GA-17 offers the fertilizer producer all these features at this price.

- **fast, precise bagging** — up to ten 100-lb. bags per minute
- **simplicity of design** — only two units; E-10 Belt Feeder and GA-17 Bagger
- **ease of operation** — just attach the bag and pull handle
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- **minimum head-room required** — scale also available in a floor portable frame
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For higher-speed production the Richardson HA-39 provides bagging rates up to 24 bags a minute at 2 oz. accuracy.

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DDVP is now being supplied in commercial quantities for authorized uses and in experimental quantities to qualified experimenters.

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DIETHYL TOLUAMIDE, the "most" successful wide-spectrum insect repellent developed by the U.S.D.A. and Army Quartermaster Corps.

Montrose DET is guaranteed to contain 95% minimum meta isomer, the most effective isomer as shown by field tests. DET aerosol lotion and spray formulations have been successfully marketed for the past two years. Montrose DET is available for prompt shipment from stock.

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that the equipment is still safe. The most likely failure points are joints and welds. Corrosion on stainless steel and aluminum is no particular problem.

As mentioned above, ammonium nitrate can inpregnate the corrosion scale and get into threaded joints. Being flammable, this can cause an explosion if a flame or electric arc is used in repair work. Never should a flame or an arc be allowed on a closed tank or pipe.

Sulfuric acid dehydrates animal tissues very badly. Consequently, extreme precautions must be taken against contact with acid. Splash-proof goggles are a must when connecting tank cars or working on pipe lines. Just as with anhydrous ammonia or nitrogen solution, flooding with water is the best remedy. Luckily, sulfuric acid has a very low vapor pressure, because only 10 to 20 parts per million will dehydrate the lungs.

The second hazardous factor with sulfuric acid is that the corrosion of iron forms hydrogen, which is very flammable and explosive. Consequently, acid lines and tanks should be treated as if they contained a flammable material. Dilute acid (below 60 baumé) will greatly increase the amount of corrosion; the acid lines whenever washed, should be washed thoroughly. Never use combustible material to wipe up sulfuric acid spills. Spontaneous combustion can be more likely with sulfuric acid soaked rags than with paint soaked rags.

To summarize the main points:

1. The attitude of many fertilizer plant personnel should be changed. They should not feel that putting on goggles is a waste of time, nor should they consider that the use of safety equipment makes them sissies.

2. Greater use of goggles to protect the eyes should be especially stressed.

3. In many cases, better tank car unloading facilities should be considered. A safety shower at this point should not be neglected.

4. The ammoniator operator could stand to have two safety showers available. His quarters are generally somewhat cramped and he could be cut off from one of these safety showers.

5. For general safety in a fertilizer plant, every working level should have a source of fresh air. This could be a pressurized stairwell, which would also serve as an escape route.

Ag FREQUENCY

(*From Page 67*)

vide a much longer period of non-interference. The restrictions and coordinations, coupled with early and late hours of operation by applicators, should provide freedom from serious interference for several years to come.

Frequencies are categorized within these services, but the itinerant frequency is the only one in each service. It is for those who travel widely and the NATA suggests that all who engage in contract operations apply for this one. Thereby, a common frequency will be available where several contractors are working together on one program and communications are desired.

Permanent frequencies, of which there are several, are authorized for normal areas of operations. There is no specified radius limit, as it is presumed that both the applicant and the FCC will be reasonable.

General frequencies, available only in the business radio service, are catchalls for those who do not fit a pattern of operations. As a result, more interference is probable here than in the itinerant or permanent frequencies.

Frequencies recommended by the NATA for aerial applicators are ones that became available only recently. The special industrial itinerant frequency is 151.505. Permanent special industrial frequencies are 151.535, 151.565, and 151.595.

Business (itinerant, 180W) frequency is 151.625. Permanent business frequencies are 151.655, 151.585, 151.715, 151.745, 151.775, 151.805, 151.835, 151.865, and 151.895.

Business general frequencies are 151.925 and 151.955.

Contract operators, by applying for the adjacent itinerant and permanent frequencies in either

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Our experience in blending and formulating should be most helpful to manufacturers projecting new fertilizer products. Our people are available for consultation at our modern packaging plant, Metuchen, N. J.

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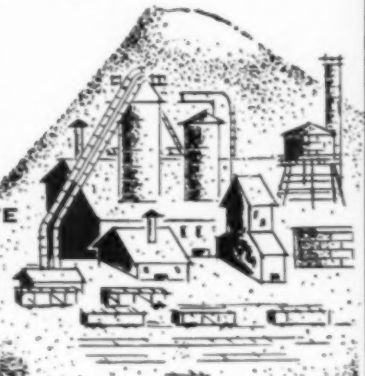

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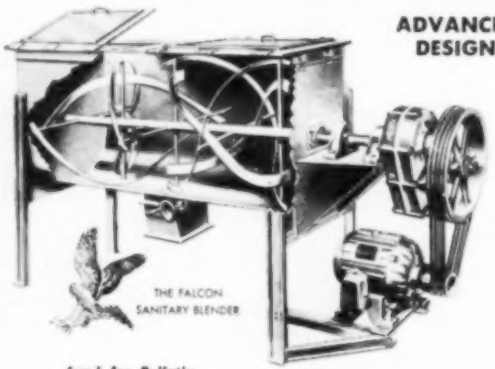

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service, will remain within the electronic limitations of the equipment for two-channel operation. However, there are other frequencies available at varying intervals from 150 to 174 MC.

The radio equipment being demonstrated at the Milwaukee meeting is normally intended for single-channel operations. At some additional cost, equipment for two-channel operations is available. To relieve operators desiring two channels of some paper work, NATA, with the aid of FCC, has prepared a standard supplemental data sheet for attachment to applications where two frequency authorizations are requested. In any event, applications for radio licenses are no more involved than those for aircraft.★★

EMULSIFIER REVIEW

(*From Page* 29)

The formulators have begun to realize that they can best be served by the emulsifier producer if they can present the anticipated technical problems for the new season, well in advance. It is most difficult for the sales predictors, however, to judge in advance which new toxicants and application markets will be important, until urgency is imminent. This is the time when many formulators cry for help — requiring "emergency" adjustments in their formulations. Only those suppliers with facile technical service can offer proper assistance.

There are, however, many instances where the formulator with foresight can predict a new product market, and can share the problem with the emulsifier producer early in the fall. If this is done, there is time to develop more thoroughly the appropriate products, along with requisite aging and testing, to arrive at the best answer for the money. Sole's advice to the formulators for the 1959 season is: Outline your tentative program *now* and share it with your emulsifier supplier. You will be the gainer. ★★

NPFI NEWS

(*From Page* 93)

has been sustaining a cut of eight to nine billion board feet per year. However, he continued, about 70 per cent of this production comes from about 30 per cent of the timbered area. Mr. Yocum pointed out that this practice can not continue for long "unless we concentrate our efforts on developing methods of research which will lead to increased productivity of the land."

In discussing the fundamental factors of tree growth, Dave Scott of the University of California, pointed out that most forest lands generally are poor from a soils standpoint, and trees differ from other crops because the period of growth extends over a long period of years.

Ray Austin of Crown Zellerbach said that forest fertilization experiments conducted by his company indicate that fertilizer increased leader growth on seedlings up to 60 per cent.

The National Plant Food Institute sponsored a tour of selected fertilizer industry operations in the Intermountain and Pacific Coast areas that began Sept. 7 in Sacramento, Calif., and ended on Sept. 12 in Pocatello, Idaho.

LISTENING POST

(*From Page* 63)

with a surfactant gave about 25 per cent lower yields, than when they were used alone. Only two of the materials, maneb and thiram, tested with the surfactant added were the same in both years. However, results within each test for the three pairs compared were consistent.

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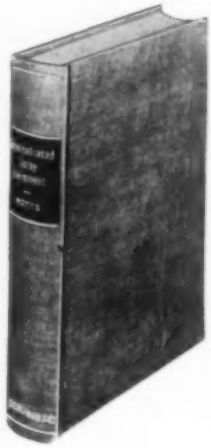

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Discussion: Dr. Chandler concludes that according to the results of these two years' trials, most available spray materials so far tested do not control both bacterial and fungus diseases and give good yields at the same time, when used alone. Further testing, both of mixtures and of single materials, is needed. The two basic copper sulfate-streptomycin formulations (Agri-mycin 500) were best among the mixtures tried in these experiments.

He added that even though an effective spraying or dusting program could be developed, the benefits might not justify the cost for many farmers. Eight sprayings, apparently, were the minimum effective number in these experiments. When maneb plus streptomycin, one of the better treatments, was applied only five times in 1957, neither bacterial spot nor ripe rot was controlled. The minimum eight-spray schedule could hardly cost less than $25 per acre. With a yield from an unsprayed field of two tons of marketable peppers per acre, which is above the state average, selling at $90 per ton, a 14 per cent increase in yield of healthy peppers would be required to offset the cost of spraying. In these tests, plots sprayed with Omadine produced yields 19 per cent higher in 1956 and 14 per cent higher in 1957 than the unsprayed plots, but disease control with Omadine was not outstanding. Before a control program can be recommended for growers' use, more tests as well as cost studies are required.★★

FERTILIZER VIEWS

(From Page 70)

as "the law of diminishing returns in agriculture," and expresses a truth confirmed by many thousands of field experiments with all kinds of plants, in all parts of the world. No one, anywhere, has been able to obtain an unlimited amount of vegetable substance from a limited area of soil in one cycle of plant growth,—that is, from seed to seed. Plants absolutely will not amplify their growth beyond a certain point, regardless of how scientifically the soil is fertilized, or how carefully its moisture, light and warmth requirements are satisfied.

Liebig was a great scientist to whom the whole world owes infinite gratitude for his contributions to agriculture's ability to furnish an abundance of food and fiber. He knew about the law of diminishing increments of yield. Yet, Liebig believed that if proper management of the soil could be learned, there would be no limit to the amount of vegetable substance that could be grown even from a small area of ground—even "from a flower pot." In other words, he and many of his followers believed that the graph of the yield of any species of plant is a straight line that would ascend indefinitely. It is now generally accepted by scientists, thanks to Mitscherlich and others of his school, that the graph of the yield is a curve that cannot be straightened out. It will ascend to a certain height, and then inexorably tends to flatten out.

The Minimum Holds Dominance?

It is not strictly true that the minimum factor, the one present in the smallest number of units, holds dominance over any given situation in plant culture. An addition of any factor of plant growth is capable of increasing yield to a certain degree, so long as it is not present already in its maximum amount, – regardless of what is done or left undone about

Handbook of Agricultural Pest Control

By S. F. Bailey and L. M. Smith

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the other factors. Mitscherlich showed by many experiments that "the magnitude of the yield is conditioned by all the factors of growth. Each single factor exercises the greater limiting influence on yield, the nearer it is to the minimum." This statement implies that the addition of a slightly deficient factor will increase yields, because it will help the minimum factors to be used more efficiently. He found that no matter what kind of crop he studied, or what growth factor he was investigating, the normal increase of yield conformed accurately to a single type of curve that could be represented by the equation:

$$\frac{dy}{dx} = (A\text{-}y)\,.C$$

in which A is the limit of yield attainable by a particular crop plant, x is the specific plant nutrient, and y is an intermediate yield produced by a specific number of pounds of x, and C is a constant effect factor characteristic for each particular kind of plant nutrient, and it determines the slope of the curve.

About nine years after Mitscherlich published his first results, a mathematician at the University of Gottinggen by the name of B. Baule rewrote the equation in this form:

$$\log 100\text{-}y = \log 100\text{-}0.301x$$

Baule substituted 100 for the A in the Mitscherlich equation to represent 100 percent of the maximum possible yield that can be produced by pushing the effect of any fertilizing material to the limit, and the numeral 0.301 is the Baule coefficient that reduces the specific effects of Mitscherlich's constants "C" to a common denominator. In the Baule equation, x stands for the number of pounds per acre of the nutrient that will account for 50 percent of half of the yield A that might be attained by pushing the use of that nutrient to the limit.

Using the Baule equation, which is a percentage sufficiency concept, it can be shown that when two or more nutrients or other factors are deficient, the final yield will be the product of their relative deficiencies. For example, a 90 percent sufficiency of potassium (K), and a 60 percent sufficiency of phosphorus (P), would permit 90 percent of a 60 percent yield, or 54 percent of the maximum yield. Baule also showed that the amount needed for the 50 percent of a yield was the amount which added to a soil always corrected half of the remaining deficiency. Thus, one unit produced 50 percent, two units 75 percent, three units, 87.5 percent, four units, 93.75 percent and so on. This amount is referred to as one Baule unit (2) (3) (4).

The reader is referred to the cited literature for more detailed explanations. It is believed that we have shown that Liebig's "law of the minimum" is inadequate for explaining the influences of plant nutrients on plant growth. The concept of the low stave on the barrel is an illustration that is easily understood and appeals to common sense. But its continued use by agronomists and others to explain the relationship between crop yields and fertilizer deficiencies perpetuates a misapprehension of the true facts. As Lange expressed it, the concept is "a cabinet specimen in the museum of rural culture." It was natural enough in its time, when we were still ignorant of the laws of growth; but it has now only a historical interest.

(2) Baule, B. (1918). Zu Mitscherlich's Gesetz der Physiologischen Beziehungen, Landwirtschaft, Jahrbuch 51:363-385.
(3) Wilcox, O. W. ABC of Agrobiology (1937), W. W. Norton & Co., N. Y.
(4) Bray, Roger H. *Soil Science* 78: 9-22 (1954).

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Sworn to and subscribed before me this 6th day of September, 1958.

(SEAL) David Tryon
(My commission expires April 12, 1959).

WASHINGTON REPORT

(*From Page 74*)

they are dealt with on a reasonable and open basis. From Washington it looks as if closer contact and a more open exchange of views among conservationists and Pesticide Industry representatives would be the best starting point for clearing up such damaging misconceptions. It is understood that a program of this kind is now in the works.

ATLAS EMULSIFIERS

(*From Page* 29)

time. However, there are several new emulsifiers in development, based on the mol ratio theory propounded by F. S. Black of Atlas in April, 1957 in an address* before the ACS in Miami, Fla.

Pending the release of the new material, Atlas will continue to recommend blends of Atlox 4500 and Atlox 4600 for the common chlorinated compounds such as DDT, Chlordane and Toxaphene. For formulators of chlorinated compounds who wish to use only one emulsifier as opposed to blending for each individual formula, and who sell in the Delta and southeast areas, Atlas offers Atlox 4525. This material is preferred by many in those areas not only because of the manufacturing simplicity offered by the use of a single material, but because of the performance advantage offered in the high sodium waters prevailing in that area.

Because of the complexity of the problems encountered in formulating herbicides, Atlas prefers, as a matter of company policy, to refrain from blanket suggestions for herbicide emulsifiers. This policy is due not only to the relatively great effect of toxicant and solvent differences on emulsion performance, but also to the fact that the manufacturer's definition of what constitutes a satisfactory concentrate varies so widely from company to company.

Among the Atlox emulsifiers currently being used by herbicide producers, Atlas Powder Company lists various blends of Atlox 4500 and 4600, and three single emulsifiers: Atlox 1255, Atlox 2081, and Atlox 2083. The latter material is used predominantly in formulations containing chloro-IPC.

Among the emulsifiers listed for use by Atlas in phosphate type concentrates, the most important to the industry are the various blends of Atlox 4500 and 4600, and Atlox 3387. The blended materials are most effective in concentrates containing two pounds per gallon or less of toxicant, while 3387 is used in a number of formulations including several of the new phosphate toxicants.★★

* "Practical and Theoretical Considerations in the Use of Surface Active Agents in Agricultural Formulations," Behrens, Black, and Greath.

NOPCO EMULSIFIERS

(*From Page* 29)

wide range of toxicants. Pesticide formulators are becoming increasingly aware of the unusual chemical stability and surface activity of this nonionic liquid.

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KELLETT AUTOGIRO

(*From Page* 58)

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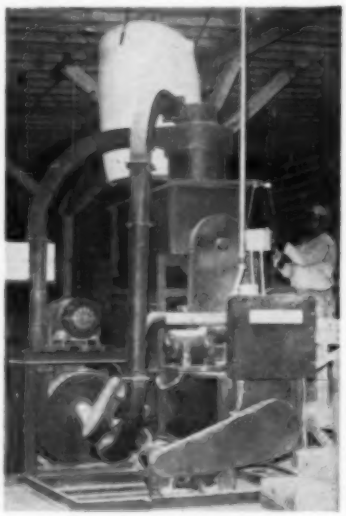

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TALE ENDS

HORMONE insecticides are the subject of an excellent article in a recent issue of *Life* magazine, recommended as required reading for everyone connected with the pesticide industry. Albert Rosenfeld, author of the article, suggests that insecticides operating on this principle would "cause bugs to commit suicide by stimulating them to grow too fast or too slow, or to emerge at the wrong time of year," when they would be unable to survive. Advantages are that hormone insecticides would be effective against insects, but harmless to everything else; there would be no problem of development of immunity; and, selective use would be possible, killing unwanted pests but not predators.

The idea of hormone insecticides has been under study for well over forty years, dating back to the work of Dr. Stefan Kovec, Polish scientist, who conducted basic research on why and how insects grow. His studies suggested the presence of a brain hormone which caused the insect to molt. Other studies in Japan by Dr. Soichi Fukuda offered proof of a second hormone. Subsequently, Dr. Carroll Williams of Harvard confirmed the existence of the two hormones, and demonstrated that the brain hormone stimulated glands in the prothorax of the insect to secrete the second hormone, which actually made the insect molt. The new hormone was called ecdysone.

Another entomologist, Dr. V. B. Wigglesworth of Cambridge University, discovered the existence of a third hormone, which serves to keep the insect from growing up too fast, and is thus called the juvenile hormone. Mixing up the hormone balance resulted in production of disfigured, freak insects which would have only a very brief life expectancy.

The final step in the development program, now under study, is the establishment of the chemical formulas for the hormones so they can be made synthetically. Dr. Williams is working on the problem at Harvard, Dr. Howard Schneiderman at Cornell, and studies are also in progress in Germany. Those conducting the work believe that the hormone molecules are simple and stable, that synthetic production will present no insurmountable problem once the formulae are known, that it will be no particular problem to formulate the hormones into usable pesticides, and that "the resulting insecticides will be the safest and among the longest lasting ever devised."

AC

Jack Brunton, sales manager for Kolker, reports in from South Africa. His trip included an 800 mile safari into the Eastern Transvaal, as well as visits to Rhodesia and Nairobi. These dedicated salesmen go a long way to sell methyl bromide. From the general atmosphere of the card which detailed Jack's travels we gather that he was working on a sideline this trip,—opening up the market for a new line of oversize sepia bras for the Maidenform outfit.

AC

A letter from S. Eisen in Chicago, appears below,—perhaps one of our readers can answer Mr. Eisen's questions.

Would your magazine have any knowledge of the following products or its sources?

INSECTICIDE POWDER: which can be mixed in with any paint product, then applied to walls. Such mixture will then kill any type of crawling insects which comes in contact with such walls for a period of about a year.

CEDAR FRAGRANCE POWDER: This is a fine pulverized powder which appears to be from Cedar Wood and mixed with Cedar Oils and other ingredients. The finished product, when mixed with water to a consistency of about cream, can then be applied to walls with a paint brush, or if desired in a thicker consistency, with a trowel. Once this is applied to walls of closets, it will convert such closets into Cedar Closets.

If you do not know of the sources of the above products, perhaps you might be able to advise who can make up such products for us.

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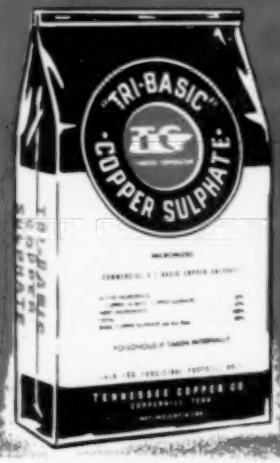

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